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THE SCOPE OF REHABILITATION IN AUSTRALIA, WITH A SUGGESTION FOR THE FUTURE.[1]

By COLIN ANDERSON,
Perth.

IT is my pleasure to welcome you to this official inaugural meeting of the Section of Rehabilitation and Physical Medicine. I am conscious of the honour of selection as President of this Section, and more so since meeting members of the profession in this State.

I trust that it will be possible to discuss with you the scope of rehabilitation and physical medicine in Australia—as seen by myself in a somewhat distant State of this Commonwealth. A similar pattern probably exists in each of the other States.

It cannot be denied that there have been great technical advances in all fields of human work. My generation has seen the development of specialities within a speciality, and this has been accompanied by an increasing torrent of the printed word. We now have "The Digest of Digests".

In this appearing confusion, the emergence of rehabilitation medicine is refreshing. The satisfactory replacement of an individual within his familiar surroundings after an illness is rehabilitation and the aim of good doctoring. I feel that, together with the lessons learnt under war conditions, the profession has become aware of its duty in assisting the reestablishment of patients who have received treatment in hospitals and institutions, and who have no general practitioner aware of their need.

It demands skill, patience and wisdom: the skill acquired by a doctor in coping with the minor and major demands of his practice; the patience necessarily acquired in learning those skills; the wisdom from the many experiences which we encounter—and one of the wisdoms is the ability to judge with candour any situation where rehabilitation treatment is suggested.

It does not demand a high technical skill in any branch of medicine. I feel that enthusiasm for a technique can narrow one's vision about the real needs of the individual.

"The Scope of Rehabilitation" was suggested as the title of this address, and this much-used word is surprisingly apt when it is realized that a translation can be "A Breadth of Vision" allowing "A Target" to be recognized.

The vision required is similar to that obtained from a windmill tower. The imperfections of one's own backyard are in sharp relief, and the various segments of one's neighbour's can be seen and recognized. The president of a section has twelve months to construct his address, and such a view brought to me the analogy that rehabilitation and physical medicine have now come from the side avenue and joined the broad stream of medicine.

[1] President's address to the Section of Rehabilitation and Physical Medicine, Australasian Medical Congress (British Medical Association), August, 1955.

This breadth of vision allows the target to be seen—the return of physically and mentally handicapped people to a self-satisfying place in society.

It would seem that this target of medical practice is, at times, obscured.

What does our experience as doctors show us in our daily practice?

We see a wide range of patients in whom physical and mental handicaps are a greater or lesser part of the illnesses for which we are consulted. For some of these patients there are governmental and voluntary agencies which will assist in certain types of cases, but there are many others who have no agency specifically concerned with their problem. In Western Australia the most obvious group consists of the epileptics.

Let us now observe the efforts which are being made in the community in rehabilitation services and, particularly, record some public statements of recent months. It is hoped to use a wide range of observation and still keep a detached point of view.

The present Rehabilitation Service of the Department of Social Services had its origin in August, 1948, when Dr. Coombs formally introduced the service.

From the experience gained in the Ministry of Post-War Reconstruction and the Department of Social Services, it was thought that sufficient experience existed to extend into the civilian rehabilitation field.

Dr. Coombs made two interesting points in 1948: (i) that, in the past, social reforms had been brought about by agitation in the community and had led to enlightened parliamentary action, but that this Rehabilitation Service did not come into being by reason of community agitation but by the action of a government; (ii) that the interest and support of the community were vital to the success of this present service.

I think at this juncture that it should be noted that the Commonwealth Government did not approach the profession for assistance in the development of this service. I am not forgetting the efforts of Dr. Douglas Galbraith to inform the profession, but this service was and still is controlled by the administrative services of the Commonwealth.

I feel that the present administrative services weave a fine web of frustration around the efforts of a professional worker and slowly dampen that enthusiasm which means the difference between good treatment and routine treatment.

Perhaps there was a lack of awareness of the degree of help which the profession could and should give, and the profession may be blameworthy in not taking a more active interest in this service. Medico-political issues were looming in 1948.

Many of you are aware that eligibility for treatment in the Rehabilitation Service has now been widened from those who were invalid pensioners or receiving unemployment or sickness benefit to include a limited number of private patients, workers' compensation patients and, more recently, the fourteen to sixteen year old group. The inclusion of this last group has been recommended for quite a number of years.

From 1948 there has been cooperation between the State Tuberculosis Control Branch and the Rehabilitation Service in handling the persons needing training to fit them for employment. The cooperation has led to many persons' being placed in employment, although one is reminded of one such person who was refused continued temporary employment by a large company when his history was obtained. Western Australia can be proud of the sheltered workshop for such chest patients as need graded hours of employment.

It must not be forgotten that there are many voluntary agencies contributing, in a greater or lesser degree, to the rehabilitation of the groups which are within the charters of their organizations. Their work has been invaluable in many spheres, but it suffers in Western Australia, in many cases, from a lack of coordination; this prevents a maximum return from the unselfish efforts which many persons put into these agencies. Many of these organizations have existed for many years and possess valuable experience in handling patients such as those suffering from poliomyelitis, the so-called spastics, the mentally retarded and crippled children.

Proceeding further afield, I would bring to your knowledge an article published in several magazines about March, 1955. It was about a Council named "A Commonwealth Ministry of Labour Advisory Council", which was composed of prominent employers and trade union officials, under the chairmanship of the Minister for Labour and National Service, and which published the following statements:

> (*a*) Simple justice demands that the physically handicapped be given an equal opportunity with the able-bodied for work they have the capacity to do. While the physically handicapped need sympathetic understanding, they should be accepted on the same basis as other employees.
>
> (*b*) Experience here and overseas has overwhelmingly demonstrated that they, when properly placed in work suited to their capacities, can be just as effective, and in certain types of work even more effective, than able-bodied workers. In short, it is good business to employ the physically handicapped.
>
> (*c*) The physically handicapped can provide a valuable addition to Australia's manpower resources and, at the same time, be given the sense of satisfaction that goes with useful employment.

In April, 1955, the Australian Advisory Council for the Physically Handicapped was invited to nominate a representative as a member of the Rehabilitation Advisory Committee to assist the Department of Social Services in the planning, development and implementation of the Commonwealth Rehabilitation Service. The other members are to be federal representatives of employers' organizations, and one representative of the British Medical Association, the Australian Council of Trade Unions and voluntary social agencies. It is understood that this advisory committee has been constituted.

The terms of reference of this committee were not publicized in Western Australia. They are as follows: (i) To advise the Department of Social Services on all aspects of the planning, development and operation of the Commonwealth Rehabilitation Service for the physically handicapped. (ii) In particular and without limiting the generality of the foregoing, to advise on: (*a*) ways and means of effecting improvements in the rehabilitation service; (*b*) the need for extensions to the scope of the service and the manner in which such extensions can best be implemented; (*c*) methods of stimulating and maintaining the interest and support of all sections of the community; (*d*) the coordination and integration of the Commonwealth's service with facilities available from other sources; (*e*) such other matters as may be referred to the committee by the Minister or Department; (*f*) any other aspect to which the committee feels attention should be drawn.

It should be noted that this Rehabilitation Advisory Committee is purely an advisory one, which will be called together by the administrative service of the Department of Social Services.

After this brief survey of the agencies within the community which are available to assist those in need, the question can be asked whether the community and the organizations within the community are assisting to employ those patients who are fit for suitable employment. In Western Australia the position is, in my judgement, an uneven and unhappy one. There are certain retail firms who are happy to employ the physically handicapped; one large store has a noticeable sprinkling of cerebral palsy patients. Within the State Government Departments there are appeal promotion boards, which hinder and frustrate in the replacement of an employee in the service. However, the less technically organized departments are usually of great assistance. I have found that Commonwealth-wide merchandizing organizations, in which medical

reports are submitted to a central office, give decisions which are harsh and cannot be understood on the more individual level.

Before putting forward a suggested method for the control and development of rehabilitation services in which the profession would be vitally concerned and which would utilize more fully the skills of the physical medicine specialist, may I sum up to this point by stating that there are relatively uncoordinated rehabilitation services within the community, together with a degree of awareness within the community of the need for such services, but that the resettlement of these rehabilitated people in suitable employment is somewhat haphazard and uncertain. It is possible that the lack of employment opportunities has been over-emphasized, but to raise the hopes of a handicapped person, prepare him for employment and then see him linger for weeks and sometimes months waiting for a suitable job is a situation which has been encountered on quite a number of occasions.

It implies a lack of awareness of how complete the approach by the rehabilitation team of doctor, ancillary medical staff and employment agencies must be to avoid implanting further frustrations in the minds of handicapped people.

It can be stated that a community can afford a percentage of its income for the provision of these services, part in the form of taxation and part in the form of voluntary giving. We assume, as a profession, that it is accepted that the maximum amount of this income should reach those in need by means of maximum efficiency and coordination.

As previously mentioned, I have doubts whether fully efficient and coordinated services exist at present. In Western Australia there is cooperation between some authorities and agencies, but certainly a lack of coordination among the voluntary agencies.

There are curious paradoxes met with by doctors when discussing medical services with lay persons. It is assumed that doctors are full of professional knowledge, but that their opinion is not of value on economic problems or methods of approach.

It is not generally realized that a doctor has to develop the faculty of critical analysis of many situations or he ceases to be in receipt of an income. He is further disciplined by knowledge of the legal processes in which he can be involved. Self-discipline becomes second nature, or his professional reputation suffers.

Therefore the suggestion is put forward that all rehabilitation services in the Commonwealth should be coordinated by the formation of statutory authorities on a Commonwealth and State level—the Commonwealth authority to be composed of Commonwealth medical and administrative representatives, representatives of voluntary, employer and employee organizations and representatives of the medical profession. I suggest that half the members of such an authority should be medical men.

This Commonwealth authority would implement the policy of the Government and be in a position to allocate moneys made available.

The State authorities would be similarly constituted, allocate moneys on a State level, supervise their application and control the staffing and conditions of service so as to coordinate, as far as possible, the rehabilitation services within each State. This type of control might assist, in an effective way, a situation such as existed in Western Australia in 1948 when that State experienced the first poliomyelitis epidemic. Two requests by the State for assistance in rehabilitation treatment were not met by the Commonwealth.

The economic situation of the community is such that, with the high level of taxation, governments monopolize the provision of moneys for rehabilitation services to a very large degree.

I feel that with the help of the medical profession more persons would receive improved treatment for the expenditure of the same amount of money and that we should see the provision of sorely needed sheltered workshops and a more energetic community effort to obtain employment for handicapped people.

This field of rehabilitation is one in which the specialist in physical medicine can play an ever-increasing part. It is hoped that such specialists will take charge of some of the rehabilitation centres which will develop in the coming years, and be able to accept the full responsibility for, and control of, all ancillary medical staff concerned in rehabilitation treatment. I personally have faith that doctors will freely give of their best endeavours towards assisting handicapped persons in the community.

I have attempted to give you the skeleton of a rehabilitation service to the community in which the profession could give leadership, coupled with a sound and practical expert opinion.

I should like to pay a tribute to Dr. Douglas Galbraith for stimulating my interest in this work, to my former colleagues in the Department of Social Services, and to Dr. O. Corr, of Hollywood Repatriation Hospital, who, as far as is known, attempted and achieved the rehabilitation of a group of paraplegics in 1946-1950.

I recommend to the profession the goal of achieving the coordination of the rehabilitation services within the Commonwealth.

REHABILITATION OF THE DISABLED, WITH PARTICULAR REFERENCE TO ITS PRESENT PROGRESS IN AUSTRALIA.[1]

By G. G. BURNISTON,
Principal Medical Officer, Commonwealth Department of Social Services.

REHABILITATION of the physically disabled is a medico-social problem demanding the interest, understanding and intelligent cooperation of all sections of the community, but especially of the medical profession.

In its complete sense it is now universally recognized as "the restoration of the handicapped to the fullest physical, mental, vocational and economic usefulness of which they are capable".

It is paradoxical in these modern times, when medicine has made such great advances in therapeutics, that a problem of "invalidism" exists.

But from America it is learned that, as at the end of 1953, there were 260,000 blind, 2,000,000 with diabetes and 500,000 with tuberculosis. There were more than 200,000 amputees who required artificial limbs. The National Multiple Sclerosis Society reported that from 50,000 to 100,000 persons were victims of this disease. More than 1,500,000 had serious hearing impairments, another 750,000 had epilepsy, and about 10,500 new cases of cerebral palsy appear each year. It is further estimated that on any one day 2,000,000 persons could be provided with vocational rehabilitation alone. Nearly all are from fourteen to sixty-four years of age.

If we compare our population figure with that of America, it is a simple matter to estimate the probable size of the problem in Australia.

As a concept of treatment, rehabilitation is as old as the practice of medicine; yet it is only in comparatively modern times that we have seen attempts to organize it. These have arisen out of the social and economic urgencies of two world wars. It was imperative that disabled servicemen and women should be whenever possible returned to the fighting front and disabled civilians to depleted wartime industries. In the first World War the work of Robert Jones is remembered; and although his

[1] Read at a plenary session on "Rehabilitation", Australasian Medical Congress (British Medical Association), Ninth Session, Sydney, August, 1955.

efforts were not sustained on any large scale in the peace that followed, Watson-Jones revived and further developed his principles in the second World War. By recognizing and treating the psycho-social as well as the physical factors of illness and injury, as many as 77% of disabled airmen were returned to combat duty.

To some extent the armed forces of Australia were provided with similar services, and the value of rehabilitation was demonstrated. But the lesson was largely forgotten here, and as a profession we have been slow in showing interest and recognizing it as an essential medical problem. Perhaps in everyday medical work we have been too close to the problem and occupied by the demands of practice. But the result has been that the development of rehabilitation in Australia has been left largely to voluntary and governmental social welfare organizations.

All of us are aware of the commendable work of the various voluntary agencies caring for crippled children. For years they have been providing coordinated medical and social services for young handicapped people.

The only national rehabilitation service for disabled adults developed in Australia to date is that of the Commonwealth Department of Social Services. It is not by any means a complete service. It was conceived in 1941. In that year a Joint Parliamentary Committee on Social Security emphasized the important need of vocational training to assist invalid pensioners to return to employment. As a result, in the ensuing years some hundreds of invalid pensioners were trained and placed in employment.

Later, in 1945, the Department of Social Services was charged with the responsibility of convalescent care and training of ex-service personnel discharged with a disability and not accepted for benefits under the *Repatriation Act*. As a result of an interim scheme then inaugurated, some 11,000 disabled ex-members of the forces were reestablished into the civilian community.

With this experience behind it, the Department in 1948 introduced its civilian scheme, which is now known as the "Commonwealth Rehabilitation Service".

The facilities of this service have, since its inception, been available to severely disabled persons seeking or receiving an invalid pension or a sickness benefit from the Department of Social Services and to persons receiving a tuberculosis allowance.

The main conditions of acceptance are: firstly, that the disability must be a substantial handicap to an individual's engaging in a suitable occupation; and, secondly, there must be reasonable prospects of his engaging in a suitable vocation within an industry or commerce a period of three years after the commencement of rehabilitation.

Recent legislation has extended the service to young persons from the age of fourteen years who appear likely to become invalid pensioners on attaining the age of sixteen years.

It is available also to those whose treatment costs will be borne by private organizations, such as insurance companies concerned with workers' compensation insurance; and, on a payment basis, to persons privately referred who are not otherwise eligible and for whom such services are essential.

Patients referred to the service from the different sources are evaluated physically, psychologically and socially for rehabilitation and, if accepted, are in most cases admitted to a rehabilitation centre.

The service has established centres in all States (except Tasmania), with total accommodation for approximately 500 men and women. A carefully planned programme of physical and social rehabilitation is provided, but they are not centres for vocational training.

Dr. Longmuir will be describing to you the function of a typical centre. Rehabilitation should commence and, in many cases, can be completed in a hospital rehabilitation department; but for the severely handicapped it can be successfully completed only in a centre geographically removed from a hospital.

The purpose or function of a centre is to complete physical recovery, to restore skill and self-confidence, and to enable the patient to meet the demands of daily living in every sense. This can be done only in a "therapeutic community of staff and patients", such as one finds at a rehabilitation centre. As one authority has said, "anyone accustomed and adjusted to the working procedure of a hospital might find it difficult to accept the not-always scientific approach of a rehabilitation centre where the patient must learn self-discipline and yet where attitudes of authority are seldom appropriate".

Dr. Longmuir will tell you how the patient's vocational plan is worked out. But I should mention that in the placement of disabled persons in employment we work in close cooperation with the Physically Handicapped Persons' Section of the Commonwealth Employment Service.

Since 1948, 7500 physically handicapped men and women have been successfully placed in employment; most of these might have been drawing a pension today. The humanitarian as well as the economic value of this is obvious.

Throughout the years of operation of this service, a close-working liaison has been developed with hospitals, voluntary organizations and practitioners. It has, I believe, provided a complementary service to essential medical and surgical treatment received in hospitals; and has also provided for practitioners medico-social treatment facilities otherwise beyond the reach of their patients.

But my work in this service has enabled me to see clearly the deficiencies in our communities for the total care of the disabled.

Rehabilitation should commence in hospital at the inception of injury or illness, and it must continue until the patient has achieved optimum recovery and maximum independence. Most of our larger hospitals have all the separate treatment facilities and some of the staff necessary for rehabilitation, but, except in one or two instances, these have not been properly coordinated and organized for constructive medical rehabilitation. The Royal Perth Hospital has established a unit for the rehabilitation of paraplegics, and the Austin Hospital in Melbourne has similar plans. In Sydney one or two of the larger hospitals are giving consideration to this need.

Some twelve months ago I completed a year studying rehabilitation in Great Britain and the United States of America. The responsibility for providing rehabilitation is recognized by the governments of both these countries. It is nevertheless regarded as a universal community responsibility, and particularly in America there is a considerable participation by voluntary organizations.

Every service I examined was a total one—that is, it provided care for every aspect of rehabilitation in individual cases and also for every disabled person in the community who needed it from the inception of his illness until he resumed proper employment.

Time does not permit reference to more than one or two centres. In both Britain and America hospital centres and centres for special types of disability, such as paraplegia—and I recall in particular the Stoke-Mandeville Centre at Aylesbury—have been organized, and a considerable amount of research has been done into methods and techniques of treatment.

During the past eight years Bellevue Hospital in New York City has developed, under the inspiration and guidance of Howard Rusk, a department which provides essentially for in-patient rehabilitation. It has 69 beds for adults, 65 for tuberculosis patients, and 20 for children.

Patients are referred to Bellevue Hospital from other hospitals and clinics in New York and from other departments of the hospital. They are assessed for treatment at an "evaluation clinic". Every aspect of the patient's disability, physical, psychological, vocational or economic, is reviewed at this clinic, and his potential for successful rehabilitation or otherwise is assessed.

Surrounding the wards are extensive areas for occupational therapy and physical therapy, and instruction in

the activities of daily living. The occupational therapy workshops include woodwork, light crafts, watch-repairing and dressmaking; and there is also a specially designed kitchen for disabled housewives, where they can be taught to cook and to attend to daily domestic activities required of them in their homes.

The physical therapy facilities include "ambulation" rooms, which have long walking alleys and many mirrors; here patients are taught to get out of wheel-chairs, to balance and to walk, and so on. There are "elevation" rooms with "mock" kerbs, steps and stairs of varying heights, and ramps at which the patients have to practise daily. There is also abundant provision for all the various extrinsic and intrinsic forms of physical therapy; and there is a gymnasium for individual and group remedial exercises.

Case discussions between the doctors, therapists, psychologists, social workers and nurses are frequent.

The most important feature of a department such as this at Bellevue is the coordination of the various professional workers under full-time medical direction. Speaking generally, I found that where the work of a rehabilitation department was most progressive, there was always a well-trained, well-motivated and experienced medical director who not only inspired and welded his team of workers together, but also encouraged the maximum cooperation from his patients.

This was particularly so at the King's College Hospital in London, where the physical medicine and rehabilitation department is one of the best of its kind to be found in Britain.

The department at King's College, under the direction of Frank Cooksey, provides principally for out-patients, but it is consulted by other departments in the hospital, especially by the orthopædic and medical departments. Cases are also referred from external clinics and practitioners.

A patient receives not merely physical therapy, but a balanced treatment programme of physical and occupational therapy according to his needs. It makes demands on the patient's active participation, frequently in a group of others with similar disability. His social needs are not forgotten either.

Interesting features of King's College Hospital are the regular meetings of an industrial resettlement clinic and a social resettlement clinic. The former is mainly concerned with the resettlement into employment of difficult subjects, and the latter with the discussion and solution, if possible, of social problems affecting the individual's recovery and resettlement. The director of the department acts as chairman of the meetings, which are attended by the registrars, almoners and therapists and the disablement resettlement officer from the local employment exchange. If necessary and practicable, the patient's family doctor is also invited to attend.

These clinics again serve to weld the rehabilitation team together and to coordinate all facilities for the benefit of the patient. Experience at the hospital has also shown that these clinics stimulate interest in the subject throughout the hospital staff.

There are also non-hospital centres similar to those we have in the Commonwealth Rehabilitation Service. It is generally agreed that these centres are essential for the total rehabilitation of the severely disabled. In Great Britain the centres are developed in relation to a hospital or group of hospitals. The Ministry of Labour and National Service has established industrial rehabilitation units, where physically handicapped people can adjust themselves to an industrial environment with its varying demands.

In industry and in commerce in Britain and America one finds considerable intelligent interest in rehabilitation. For example, the Vauxhall and Austin motor works in Britain provide retraining workshops for their disabled workers. In these workshops are lathes specially adapted for functional treatment, where the disabled worker can resume employment while under medical supervision and continuing actual functional treatment. It is agreed that provisions such as this not only hasten early recovery to full unrestrictive employment, but also maintain at a very high level the handicapped person's morale.

In America, industry and commerce are coerced to employ the disabled by employers' organizations; and a considerable amount of publicity is given by employer organizations and voluntary organizations to the "good business" of employing the physically handicapped. In Britain, on the other hand, legislation provides for the compulsory employment by all firms employing more than 20 persons of at least 3% of physically handicapped persons. In addition, certain types of work have been designated as suitable only for disabled people. This has resulted in a greater appreciation by employers and employees of the abilities of the physically handicapped, and there is very little, if any, need to enforce this legislation.

For the disabled person who cannot resume employment in normal industry or commerce, Britain and America have provided sheltered employment. In the United States of America sheltered workshops are mostly administered by the numerous voluntary non-profit organizations, some of which provide workshops for special disabilities, such as tuberculosis and cardiac diseases.

In Britain, voluntary organizations provide sheltered workshops on a small scale, but the major provision is made by Remploy Limited, which is a non-profit government-sponsored organization. Remploy has provided 90 workshops throughout Great Britain covering a large variety of trades. Britain has also established special vocational training centres for courses lasting up to nine months to improve or enhance the disabled person's employability.

In both countries rehabilitation is a continuous process from the time of injury or the inception of illness until the individual is able to resume some form of employment.

How do we compare in Australia? It might be asked: have we developed or provided all the facilities necessary for complete rehabilitation? I have explained that the majority of our larger hospitals, although possessing physical therapy and occupational therapy facilities and possibly almoner services, have not coordinated and welded these into a unit which could be called a "rehabilitation department".

At the vocational end of rehabilitation there is not the same practical interest here in the employment or reemployment of the disabled in industry as one finds overseas. Certain employers' organizations, however, are beginning to interest themselves actively in the employment problems of the disabled worker. The Employers' Federation in Victoria, for example, has recently been very active in investigating employers' attitudes to this problem and supporting the employment of handicapped people. We have found, too, an increasing interest in the question by employee groups, and some trade unions cooperate very actively.

We have not developed sheltered workshops to the extent one finds overseas. There are one or two small sheltered workshops in some of the States of the Commonwealth. These are run by organizations interested in the employment of the tuberculous or by those interested in the civilian maimed and disabled. In their small way they are doing excellent work.

There is still much that can be done, however, for the protected employment of such groups as the chronic tuberculous, the chronic epileptics, asthmatics, cardiacs, the mentally retarded, and so on. The Commonwealth Government believes that provisions of this nature would be made better by voluntary organizations. It is my personal opinion, however, that all organizations, including the Commonwealth Rehabilitation Service, should cooperate in solving this problem, which is at present misunderstood by many and regarded with suspicion by employer and employee groups.

In the Commonwealth Rehabilitation Service during the past seven years we have learned to appreciate the contribution of the community as a whole in this field. To develop this contribution and cooperation, advisory committees have been formed, bringing together medical and allied technical groups with representatives of voluntary organizations and employer and employee groups, to discuss and recommend to the Commonwealth Government ways and means of improving its present service.

There is no doubt that, whilst it depends upon the concerted efforts of many experienced social, ancillary medical and lay workers, the responsibility for the successful resettlement of the disabled in the community rests finally with the medical profession. Within the profession we need not only more men trained to appreciate the many facets of rehabilitation and able to evaluate and treat the varying contributing factors to disablement, but also a greater appreciation by the profession as a whole of the importance of total care of patients.

Dr. Howard Rusk, of New York, speaks of the "third phase of medicine, the first being prevention, the second special surgical or medical treatment, and the third that part of patient care which takes him from bed to job".

When physicians and surgeons are fully aware of the importance of this "third phase" of medicine, and are prepared and qualified to assume as much responsibility here as in the earlier therapeutic phase, then we will be much further forward in Australia in preventing invalidism.

THE PLACE OF A REHABILITATION UNIT IN A GENERAL HOSPITAL.[1]

By SELWYN NELSON,
Sydney.

THE concept of health as a positive state of well-being has superseded the older concept of mere "absence of disease". Similar progress has been made in our ideas of responsibility for treatment of that group of the sick and injured who, in spite of advancing medical knowledge, cannot be cured. The damaging effect of prolonged illness on the individual is also recognized as a psychological handicap to full recovery. It is now recognized that it is not sufficient to utilize the orthodox methods of medicine and surgery until the condition of these patients has been stabilized. The responsibility of the medical attendant includes the use of methods of treatment which aim at the restoration of the physically handicapped to the fullest physical, mental, vocational and economic usefulness of which they are capable. This phase of treatment is known as rehabilitation. The techniques of rehabilitation depend on a combination of physical and psychological methods of treatment, but cannot be fully exploited in a community ignorant of its aims and potentialities.

Four things are necessary for optimum results. The first is an informed appraisal of the possibilities in the individual case. This means that the medical attendant should be aware of what a properly conceived plan of rehabilitation can offer his patient and take steps to initiate the appropriate treatment at the earliest possible stage. In many cases the early phase of rehabilitation proceeds concurrently with medical or surgical treatment. If there is delay in starting the rehabilitation programme, there may be not only prolongation of the disablement, but in some cases the development of a pension complex which may be a permanent barrier to success.

The second requirement is the whole-hearted cooperation of the patient. He or she will be required to work hard to attain the goal. It is necessary to examine his problems from the educational, economic and personal angles, and to take steps to remove any barriers tending to prevent cooperation. The advantages of independence over the easier life of the pensioner must be convincingly demonstrated. In some cases the idea must be "sold" to the relatives as well.

The third requirement is the orientation of the attitude of the general public towards the ideas of the absorption of physically handicapped in the working population of the community. The Australian public is unfortunately accustomed to thinking in terms of pension and compensation rather than in terms of rehabilitation and return to work. Union leaders look askance at fellow workmen who are not 100% physically fit, especially if they are asked to accept them as transfers from other types of occupation. Employers likewise are reluctant to employ partially disabled persons. It is idle to carry out full rehabilitation programmes if the goal of economic independence of the individual is rendered unattainable by such extraneous factors.

The fourth and most important requirement is the existence of efficient and available centres or units where the highly complex techniques of rehabilitation can be effectively carried out. Great advances have been made in the methods of rehabilitation since the 1939-1945 war. These advances emphasize the need for the grouping of people with a wide variety of special training into a team, and also the need for special types of equipment to assist with the physical and vocational training of the patients. The Commonwealth Government through its Department of Social Services has made a start in Australia by establishing centres in the various States, where at the present time a limited group of patients are accepted. These are, in the main, those on invalid pensions or sickness benefits who are likely to be restored to economic independence within a period of three years, together with a limited number of worker's compensation subjects and a few private patients. It is expected that there will be a gradual extension of the groups for whom these services are available.

When we consider the role of a rehabilitation unit in a general hospital the role of the Commonwealth Rehabilitation Service in the overall requirements of the hospital patients must be borne in mind. While a close liaison can and does exist between hospital administration and the officers of the service, transfer to a Commonwealth unit must await the discharge of the patient from the hospital. This means in many cases the delay of effective treatment for many weeks, with adverse effects on the patient's attitude towards return to work. Other persons, such as housewives, who are important members of the community, but not gainfully occupied, do not qualify for admission to a centre at all. Then there are the cases in which the coordinated use of the rehabilitation techniques could reduce the duration of invalidity, although there is no question of permanent incapacity or any vocational training requirement. For these patients attendance at the unit could save many weeks in the convalescent period. In addition to these, there are the patients whose ability for self-care may be established by a rehabilitation programme, even if there is no likelihood of return to economic independence.

There are, therefore, four groups of patients for whom a hospital rehabilitation service could be of value: (*a*) those eligible for Commonwealth Rehabilitation Services in the phase of continuing hospital (in-patient or out-patient) care; (*b*) those ineligible for Commonwealth Rehabilitation Services for such reasons as "not gainfully occupied"—for example, housewives; (*c*) those unlikely to be fully restored to economic independence but who might be upgraded in the degree of self-care by such treatment; (*d*) convalescent patients whose ability to return to their former occupation is not in question.

It is considered that the training for a different occupation is beyond the scope of a hospital rehabilitation unit.

The Existing Hospital Organization.

If we turn now to the existing situation in a general hospital, such as the Royal Prince Alfred Hospital, Sydney,

[1] Read at a plenary session on "Rehabilitation", Australasian Medical Congress (British Medical Association), Ninth Session, Sydney, August, 1955.

it is germane to the problem to review what is done about these matters. Of a total of 1466 beds, general public, gynæcological, obstetric, private and intermediate and convalescent, there are 655 in the general section. There is also a large out-patient department, which includes a number of special clinics, admitting 66,604 patients in the year ended June 30, 1954. The convalescent hospital is located about eight miles distant from the main hospital and has a bed capacity of 49.

While there is no coordinated scheme for the rehabilitation of patients, certain of the techniques of rehabilitation are in use. The occupational therapy department treated in one year (ended June 30, 1954) a total of 598 patients from the general hospital and 110 patients from the convalescent hospital. The physiotherapy department in the same period gave 146,454 treatments to in-patients and out-patients (massage, medical gymnastics, radiant heat, electricity, short wave). These measures are in the most part prescribed by the attending physicians or surgeon and only partly cover the requirements for rehabilitation.

The almoner department maintains a close liaison with the rehabilitation branch of the Commonwealth Social Service Department. The benefits of rehabilitation are explained to patients who are considered medically and personally fit for the help available. Many others are reviewed from the viewpoint of rehabilitation potential and the problems involved discussed with the honorary and resident staffs. In the year ended June 30, 1954, 14 patients were transferred to the Commonwealth service.

In addition to the almoner department's liaison, the Commonwealth department takes the initiative in investigation of patients in hospital who are in receipt of social service payments for over three months. The hospital is requested to make a report on the medical condition of such patients, and where practicable an interview is arranged with a medical officer of the department with the object of assessing the patient's fitness for treatment in a Commonwealth centre.

Survey of Rehabilitation Requirements within the Hospital.

With the object of obtaining information concerning the magnitude and range of the rehabilitation problem within the hospital and the value of a hospital rehabilitation unit, a survey was undertaken of the in-patient population of the hospital on one particular day. A nominal roll of every patient in the general wards of the public section of the hospital on a specially designed form tabulating information relating to age, sex, diagnosis *et cetera* was completed on the morning of June 24, 1955, by the resident staff. The resident medical officers were asked to express their view on the rehabilitation requirements of their patients. They were briefed by the clinical superintendent (Dr. J. Richards) and the assistant almoners attached to their units were available for discussion; in addition, each received a sheet of explanatory notes. These forms were available to me on the same day, and from the information tabulated 179 patients were selected for further study who appeared to present problems in rehabilitation. These were studied by some or all of the following methods: personal interview, discussion with almoners, discussion with resident medical officers, discussion with ward sisters, perusal of medical history records.

At the Dame Eadith Walker Convalescent Hospital 42 patients were studied on June 29, 1955 (male 15, female 27). Here are received patients from the general hospital who fall into various categories: short-stay convalescent patients; old people suffering from orthopædic disorders (for example, fractured neck of femur), who represent in the main problems of disposal; long-stay convalescents in need of rehabilitation; long-stay convalescents in need of further medical care who do not at the time require constant general hospital type nursing or medical attention. Occupational therapy and physical therapy are available, but there is no supervision by anyone trained in methods of rehabilitation.

Findings.

At the time of the survey 564 patients were in the wards. Of these, 291 were males, 273 females. Age distribution is shown in Table I.

TABLE I.

Age (Years).	Number of Patients.
Under 10	31
11 to 20	55
21 to 30	65
31 to 40	75
41 to 50	97
51 to 60	93
61 to 70	95
71 to 80	41
Over 80	12

The types of patient by system mainly affected are shown in Table II.

TABLE II.

Type of Patient.	Number of Patients.
Medical	231
Surgical	160
Orthopædic	48
Ear, nose and throat	34
Eye	19
Neurosurgical	17
Psychiatric	33
Urological	20
Skin	2

Of the 179 patients selected for special study, the 116 considered to have problems likely to be assisted by methods of rehabilitation were considered from the viewpoint of immediate need, later need and a combination of both. Seventy-six patients were thought to require such assistance at the time of the survey. Of these, 68 would need a prolongation of the treatment beyond the likely period of stay in the hospital. In 40 cases it was considered that the condition at the time of the survey was unsuitable for active measures, but the disease was such that later rehabilitation treatment would be advisable. This might be within the hospital, but in the main would be after discharge. In view of the likely changes in government policy, the nature of which are at present unknown, a detailed analysis of those likely to be accepted

TABLE III.

Distribution by System Mainly Affected of 116 Patients Considered Suitable for Rehabilitation.

System Affected or Disease.	Number of Patients.
Cardiac	4
Neurological	17
Paraplegia[1]	5
Poliomyelitis[2]	3
Locomotor (excluding fractures)	15
Fractures	18
Thoracic disease	7
Gastro-intestinal	4
Vision	4
Speech	4
Psychiatric	21
Alcoholism[2]	9
Unclassified	5

[1] Paraplegia means traumatic affection of spinal cord following vertebral injury.

[2] Poliomyelitis and alcoholism are listed separately as constituting special problems, and are not therefore listed under neurological and psychiatric respectively.

by the Commonwealth Rehabilitation Service was not made. (It is noted, however, that in the previous year only 14 patients were placed in this way by the almoners. Correspondence was noted on several files indicating the interest of the service in certain patients, but these were at the time unsuitable for transfer from hospital.)

Dame Eadith Walker Convalescent Hospital.

Table IV shows the analysis of the 42 patients at the Dame Eadith Walker Convalescent Hospital. In the case of the old people the disability was mostly a fractured neck of the femur which had rendered them incapable of self-care. Many lived alone or with elderly relatives who could not undertake to cope with them in their partially disabled state. These were awaiting nursing home or State hospital admission.

TABLE IV.

Types of Patient in Dame Eadith Walker Convalescent Hospital (on June 29, 1955).

Classification.	Male.	Female.	Total.
Short-stay convalescent	6	6	12
Long-stay convalescent or needing further medical treatment	3	2	5
Old people awaiting transfer to suitable institution	2	8	10
Long-stay convalescents needing rehabilitation	4	11	15
Total	15	27	42

Discussion.

In the analysis of the hospital population the acute cases in which there is a good prognosis may be eliminated immediately from consideration. Likewise chronic cases in which the patients are likely to return without undue delay to their original occupations are eliminated. Here the factors of disability and nature of employment are interrelated. The housewife is usually less of a problem than the income-earner. Transport plays a part in the problem, as ability to cope with modern traffic and the crowded public transport system demands a degree of agility often greater than that required to do the job. When those who are too well to need rehabilitation have been eliminated, the group with a hopeless prognosis and those who are too ill (that is, those in need of continued medical or nursing care) are also eliminated. This leaves a group of problem patients, who must then be studied carefully. They may be divided into those who, for economic, financial, family or personal reasons, are unavailable, and a second group who qualify both on medical and on general grounds for rehabilitation. Some of these may not be likely to cooperate for reasons of prejudice or laziness; if efforts to capture their interest are unsuccessful, they also are lost to the plan. The final analysis of those who remain in the group is on the basis of intelligence, education and previous job training. The plan of rehabilitation is then formulated with a view to restoring these to economic independence as rapidly as possible. The criteria for selection for partial rehabilitation need not be as rigid as those for vocational retraining. Much good may result to individuals unfit for resumption of gainful employment on the basis of restoration of self-care, mobility and hobby work or part-time employment. It is here that the hospital unit may play a part outside the scope of the Commonwealth Service. Many individuals also have a suspicion of government agencies. By initial treatment at a hospital unit such suspicions may be allayed and useful training commenced prior to transfer to another centre. By this means the habit of invalidism may never develop.

A single man of twenty-nine years was admitted to hospital under the care of Dr. T. M. Greenaway on June 15, 1955. He is in receipt of an invalid pension on account of an old poliomyelitis lesion of the left lower limb, which has been present since the age of two years, and epilepsy, which developed at the age of eleven years. In spite of these disabilities he attended school and worked until two years ago. The left knee has been ankylosed, but there is little power in the flexors and extensors of the thigh, and there is shortening of the leg with a flail foot. The epilepsy is under satisfactory control. He showed little interest in work. When interviewed he was composing music. A beard, moustache and long hair were in keeping with his occupation. As a single man without dependants, living with his parents, the life of an invalid pensioner was obviously more appealing than going to work. The disability, although formidable, was in reality no barrier to economic independence.

The Paraplegic.

Overseas clinics, such as that at Stoke-Mandeville, have demonstrated what can be done for the paraplegic. The five patients in hospital at the time of the survey all demonstrate to a greater or lesser degree how far short of such results are those obtained in the absence of special units. In particular, bladder training, the most important individual aspect of treatment, was imperfect, and most of the patients suffered urinary tract difficulties. Pressure sores were also a problem. One patient was likely to achieve independence as a teacher of handicrafts; the others were still in need of prolonged medical care. Only one was able to lead an existence bordering on self care.

The Cardiac and Thoracic Groups.

The cardiac and thoracic groups comprise the surgical patients—those undergoing valvulotomy and pneumonectomy. They are reasonably well catered for under the present system, as they are retained in hospital long enough to receive physical training at the hands of the physiotherapists. In some cases vocational retraining may be of assistance. They are included in the group suitable for immediate rehabilitation.

The Neurological Group.

In the neurological group are mainly patients with medical disorders of the spinal cord or brain associated with hemiplegia or paraplegia. Some such patients in hospital with progressive lesions, such as Friedreich's ataxia, have been excluded. Those with non-progressive lesions require rehabilitation treatment in hospital and after discharge. The poliomyelitis group, listed separately, are long-term patients, for whom agencies outside the hospital may provide adequate resources at the present time. The group with aphasia or other speech difficulties require a speech therapist. At present they are sent elsewhere for treatment. One patient with carcinoma of the larynx might require to be taught œsophageal speech.

The Psychiatric Group.

The existing facilities of occupational therapy and limited physical therapy could be improved by a full programme of physical training in groups in a gymnasium, hydrotherapy and an extension of the range of occupational therapy. Those capable of benefiting by such measures are therefore included in the statistics.

The alcoholics are a special problem. Those in hospital at the time of the survey were not admitted primarily for alcoholism. Mainly there were complications such as encephalopathy, portal cirrhosis or hæmorrhoids. Apart from the medical problems involved, their successful reabsorption within the community depends on psychological rehabilitation.

There are special cases of psychiatric basis in which there are manifestations of systemic disease. One girl of seventeen years complaining of general abdominal pains was investigated in the medical professorial unit and finally regarded as having a personality defect. While of high intelligence and good education, she is nevertheless haunted by feelings of sexual guilt and had an over-indulgent mother who died two years ago. Alone and baffled, she has withdrawn from human contacts and has taken refuge in a flight into illness. Such a person might well benefit from the individual treatment and group activity in a rehabilitation centre.

The Gastro-Intestinal Group.

In the gastro-intestinal group are mainly the patients who have had abdomino-perineal resections or other major surgical interference. While not in need of vocational retraining, they come under the heading of accelerated convalescence.

Locomotor Disorders.

The locomotor disorders include arthritis and orthopædic disorders, excluding fractures, vascular disorders of the lower extremity and amputations. Some of the patients are suitable for the Commonwealth service. One woman, aged forty years, in receipt of the invalid pension (post-gastrectomy with popliteal artery obstruction) may well be trained for suitable employment after surgical treatment of the popliteal artery.

The arthritics, of whom there are very few in hospital, present a special problem, coming from the out-patient rather than the in-patient material. Where medical treatment cannot effectively control the disease there is value in attendance at a hospital rehabilitation unit to learn methods of home management, self-care and the use of specially adapted household and personal appliances. Physical methods of treatment are in use without the establishment of a special centre. Arthritics fare very badly in hospital, where they compete for nursing attention with the obvious and insistent demands of the acutely ill patients with hæmatemesis, cardiac failure and cerebral vascular catastrophes. Consequently, much of the available treatment time is wasted, and one tends to keep them out of hospitals as at present organized.

The Fractures.

Where patients with fractures are grouped in an orthopædic ward they fare very well. Physiotherapy and occupational therapy are available, and there are no serious contenders for priority in treatment. The aged usually fail to recover full function, but are not a problem in rehabilitation but rather in disposal. A wider range of occupational therapy and better facilities for speeding return to work of the younger groups could be envisaged under such a plan, and they are obviously included in the group for treatment by the rehabilitation centre.

The Convalescent Hospital.

Three out of the four males requiring rehabilitation were orthopædic patients likely to be taken over by the Commonwealth service. The fourth, a child suffering from poliomyelitis, is to be transferred to the care of the crippled children's organization. Of the women, two, aged seven-one and seventy-two years respectively, have fractures of the femur, but could be rehabilitated to the extent of resumption of limited domestic duties. The others are in the following categories: one arthritic, four orthopædic, one cardiac, one gastro-intestinal, and two nervous. In none of these is change of occupation a problem.

The Hospital Rehabilitation Unit.

From the foregoing I think it is obvious that a case can be established for the setting up of a hospital rehabilitation unit, which would serve a group of patients not catered for by existing services, as well as carrying out more efficiently some of the work at present done in other ways. The patient load from the in-patient services might be expected to be about 70 at any given time from the general hospital alone. To this would be added a variable number from Gloucester House (private and intermediate), possibly not exceeding 10. The out-patient load would be difficult to calculate. Many of the patients discharged from hospital would continue to attend, together with a much larger number from the out-patient clinics. It is very probable that there would be a demand by the insurance companies for treatment of injured workers. The contribution of such a unit to the welfare of the community could be very great indeed.

The unit would need equipment for a gymnasium, facilities for a full range of physiotherapy, and a well-equipped occupational therapy section, which should include facilities for light woodwork, metalwork and pottery. Dummy traffic lights, full-scale models of the entrances and steps of trams and buses, and a model kitchen illustrating the various "gadgets" with which the partially incapacitated can manage housework should be included. There should be a permanent exhibit of aids to dressing and eating, and equipment for toilet and bathroom. Provision should be made for group participation in play-reading, debating and other mental exercises.

The hospital would need to employ additional staff—almoners, physiotherapists, instructors in wood and metal work, as well as additional occupational therapists. A speech therapist, a psychologist and an education officer are also necessary. There will be much additional work for the honorary medical staff—physicians, orthopædic surgeons and the specialist in physical medicine, who will require the assistance of full-time medical officers interested in the special techniques of rehabilitation.

The teaching value of such a unit is considerable and would provide much-needed instruction for undergraduates and post-graduates alike.

It is hoped that this plan will be realized in the not-too-distant future.

Summary and Conclusions.

The case for the establishment of a rehabilitation unit at a general hospital is presented on the basis of the widening concept of medical responsibility to the sick and physically handicapped.

An analysis of the numbers and types of patients in hospital on the basis of a one-day survey is presented, together with an estimate of the numbers and types of patients likely to benefit from the establishment of a rehabilitation unit in the hospital.

The place of such a unit with reference to existing services provided by the Rehabilitation Service of the Commonwealth Department of Social Services is discussed.

The organization, equipment and staff requirements of a hospital rehabilitation unit are set out. It is considered that such a unit would be of great value to the community in the care of groups not covered by existing services and in the institution of treatment at an early stage of illness. Its training potential for undergraduates and post-graduates should add greatly to its value.

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THE FUNCTIONS OF A REHABILITATION CENTRE AND ITS IMPORTANCE IN A TOTAL SCHEME OF REHABILITATION.[1]

By D. O. LONGMUIR,
Senior Medical Officer, Department of Social Services, Victoria.

THIS paper outlines experience over a number of years, in the development, organization and medical management of rehabilitation centres. The organization outlined approximates to Commonwealth Government residential and day attendance centres in Victoria, operating successfully for prescribed groups of the civilian population since 1948. Similar organizations exist in all States.

I believe the rehabilitation centre to be an essential unit in present-day planning of community medical services.

Factors Contributing to the Need for Full-Time Rehabilitation Centre Programmes in Cases of Long-Term Disability.

Both physical and psychological after-effects of severe illness tend to become fixed and permanent in direct relation to the passage of time. It is not common sense to organize the full time and energy of highly trained hospital teams to combat the acute phases of illness, and to relegate functional recovery, social adjustment and vocational reestablishment to sporadic part-time supervision and care. The same care should be put into functional recovery and resettlement as goes into primary treatment.

Although it is increasingly preached that medicine views the patient as an individual, not merely as an interesting disease entity, this doctrine is still far from being generally practised. The total factors which should be known about an individual with a long-term disability are often only sketchily investigated. Various individuals know certain facts, but seldom is there time available from more urgent things for knowledge to be pooled and integrated into a total treatment plan. This is possible only in an organized full-time service.

Out-patient attendance for many patients at home is a hazard and an incomplete answer to their total needs. Return to home and family will always be the most powerful stimulus to recovery. Where home conditions are physically poor or psychologically unsound, the home-out-patient regime can be a breeding ground for unnecessary invalidism.

Many of our country hospitals still carry negligible or incomplete ancillary medical services—no almoner, no physiotherapist, no occupational therapist. This, coupled with the predominance of manual labour in country districts, is a fertile breeding ground for hopelessness and unnecessary incapacity.

While in hospital, the severely disabled patient thinks only abstractly about return of function. On his discharge from hospital, simple activities of living become major hurdles and challenges. Only hypochondriacs are interested in pathological findings. Return of well-being and physical and mental function is the predominant obsession. Even these are consciously treasured, not for themselves, but for what they can accomplish. Can the patient work and earn a living, indulge in his old recreations, resume his old social standing, and exist in competition with others?

How often do we, as medical men, leave the solution of these things to the patient or to others? Yet are they not the final expression of our medical end-result, deserving our full-time supervision?

Year after year of rehabilitation practice reveals the same unchanged misconceptions of disability prognosis, and the fixed unnecessary restrictions of activity that patients impose on themselves. Passivity and lack of initiative in many long-term invalids is as much an indictment of their treatment as it is of their own shortcomings. No standard out-patient department or average consulting practice has the time, the full staff or the facilities to take a full history of the individual's functional shortcomings and successfully pursue their eradication. The rehabilitation centre is equipped to do this in very short time.

All severely disabled patients should have their ability to perform daily living activities, eating, dressing, toilet, ambulation, transportation and communication, checked by test. Inquiry is not sufficient. Correct method and shortcuts to performance can be taught. Time of performance can be drastically shortened by repetitive practice, and permanent hazards tackled with method and a light heart, not with constant fear of further injury.

Patients with united fractures who never run, who give up manual labour and abandon well-loved recreations; weak joints and joint effusions entirely due to weakness of uninjured key muscles; perfect amputation stumps with fixed flexion contractures preventing the use of an artificial limb; persistent useless drug routines; unnecessary diet restrictions; continued use of unnecessary splints and appliances; unnecessary downgrading from skilled to unskilled employment. This list could be interminable. In most of these cases sound primary advice has been given when time permitted, but repetitive practice under supervision and constant encouragement is lacking. The first flush of reassurance from the consulting room often lasts just about as long as the first twinge of unusual pain accompanying performance of the task on which the patient was reassured. Making aftercare a full-time job is the best insurance for maximum recovery.

The value of fellowship and group work in recovery cannot be over-estimated. The rehabilitation centre is the only medical institution to have fully developed and exploited these factors for medical gain.

Exercise in an individual cubicle is often boring; or unguided at home, both boring and ineffectual. According to temperament, too much or too little effort will be used. Comfort, reassurance and courage come from tasks performed with others. In a rehabilitation centre there is always somebody with somewhat similar problems, a little advanced on yourself, or a little worse than yourself. A spirit of competition readily arises. It is easier to be venturesome when help and guidance are always at hand. For many patients, joint range, muscle power, speed and coordination and confidence are better achieved by absorption in competitive games, or while concentrating on group occupational tasks, than by set formal exercise. Group exercise, group pastimes and test living in the disablement community are now established techniques for full functional recovery and reestablishment after long illness.

Many rehabilitation centre patients have told me that through their long term in hospital they dreamed of nothing but return to home. The first flush of their return home was everything they had wished for. Soon, however, they began to get under the feet of their families. The material welfare of their home had deteriorated, and they were not fit to do much about it. Their wives, who battled on without murmur while they were acutely ill, began to produce many hidden problems of finance and family management. This mechanism of frustration was little relieved by monthly hospital review or twice weekly physiotherapy attendance. In these circumstances the patient reacts, according to his basic temperament, with aggression, bad temper and bad habits, or with inadequacy, withdrawal and neurosis. The full-time organized rehabilitation centre programme is often the quickest way back to work and self-respect, despite further prolongation of absence from home and social environment. Many patients on discharge from hospital are not fit for return to normal living, without the intermediate experience of the community rehabilitation centre.

The rehabilitation centre is the only after-care institution where treatment and reestablishment planning proceed at the same time with common economical use of

[1] Read at a plenary session on "Rehabilitation", Australasian Medical Congress (British Medical Association), Ninth Session, Sydney, August, 1955.

staff and facilities. Under many existing treatment regimes patients are certified unfit for work for many months, then suddenly, without any preparation or conditioning, pronounced fit for full-time work. Very little has been done to prepare them physically or mentally for that objective. Their capacity for work and their attitude to work are greatly unknown. Patients themselves often have little knowledge of how much their skill and ability for their old job have been impaired. In their first post-illness job they practise on their employer, and sometimes lose both job and their confidence in the process.

The position is worse for adolescents with severe disability who have missed education through illness and have never worked. Apart from lack of specific skills, they often completely lack general work habits and work morale. In many cases only an organized environment which combines continuity treatment with work assessment facilities can successfully reestablish long-term disabled people to a happy working life. The rehabilitation centre replaces advice and intuitive judgements with trained staff and facilities for patients to test themselves, to teach themselves, and to become both confident and proficient by repetitive practice under medical supervision.

Definition.

A rehabilitation centre is a functional after-care and assessment unit, constituting a necessary bridge between acute treatment and return to useful employment and normal living.

Such an intermediate phase is indicated in long-term illness or injury, where the nature of the illness, with its effect on the patient's social or vocational history, carries a threat of drift to invalidism, maladjustment or unemployability, unless the patient is placed in an environment organized to devote full-time attention to his problems. The centre's aim is integration of medical, social, psychological and vocational history and findings into "total handicap" diagnosis and treatment.

The casework of such a unit is a planned campaign against total handicap. Here, in a sheltered but purposeful "therapeutic community", medical, ancillary medical and lay people are gathered to treat, assess and supervise trial of community living, as a prelude to return to normal life.

The rehabilitation centre organizes a full-time attack on all factors militating against maximum recovery of function, while at the same time developing residual abilities to cope with return to normal life.

In operation this is achieved by a balanced daily programme of continuity treatment, physical and mental activity by exercise, recreation and occupation, evaluation of ability to cope with the physical demands of daily living, psychological and social assessment, and final assessment of work tolerance, including the patient's general employability potential.

A successful programme should achieve maximum return of physical and mental function, in minimum possible time, with satisfactory social and vocational reestablishment.

Component Units of the Rehabilitation Centre.

Residential, Day Attendance, Combined Day Attendance and Residential Centres.

A residential centre is always a more complete and satisfactory unit than one designed for day attendance only. Both centres can equally well provide daily remedial and assessment programmes, and there is no valid reason why the remedial sections of both types of centre should not approximate closely in facilities, equipment and staff. It is ideal to have both types of unit to cover the demands of every situation. The combined residential and day attendance centre, as used in a number of States in our Commonwealth Government scheme, is the best compromise.

A residential centre always provides a fuller environment for total observation and treatment purposes, because its basic subdivision into living section and working section can reproduce many test situations found in everyday life. There is opportunity for observation at work and play, at remedial programme and during recreative leisure. We can observe the effects of group treatment and competition in daily programme, and the reactions of the individual to the give and take of community life.

Metropolitan patients with good home and social background do well at day attendance centres, provided transport problems for those severely handicapped are covered by a home to centre pick-up service.

Residential centres cover country patients, patients whose home or social circumstances hinder recovery, patients still in need of daily nursing, and patients for whom a period of full observation in a test environment is clearly indicated for other reasons.

The following outline applies to a residential centre, divided primarily into (*a*) living wing and basic supportive services and (*b*) working wing and treatment-assessment services.

Basic Services.

Basic services include general administration, patient and staff quarters, general dietary arrangements, transport, accounting, pay and allowances, stores, purchasing, housekeeping and general maintenance.

This paper does not deal with these services, but several points are worthy of note.

Whatever the organizational pattern of the rehabilitation service headquarters, it is essential that the centre senior doctor be in a position to review and condition the standards of these basic supportive services. General standards of quarters and recreative areas, adequacy of dietary provision, centre hygiene, medical suitability of transport, suitability of house discipline for sick people, suitability of amenities and leave arrangements must all be integrated with the medical objectives of the centre.

It is very easy for a well-run holiday hostel to masquerade as a rehabilitation centre. Such units are not uncommon, they serve a very useful purpose where recuperative holiday only is indicated. When, however, they take the name of rehabilitation centre without providing the organization, facilities or trained staff for the purpose, they bring the principles of rehabilitation into disrepute with the busy practitioner. Many centres fall down on a proper balance between basic amenity and remedial services.

Treatment-Assessment Services.

The treatment-assessment services are set out in the accompanying chart of organization (Figure I).

Functions of Individual Sections.

The Role of the Doctor in the Rehabilitation Centre.

Every rehabilitation unit should carry a full-time or part-time medical director or senior doctor, supported where necessary by a team of sessional colleagues.

The senior doctor heads the casework team and is responsible for the organization and development of remedial and assessment services, the duties of the casework staff and the daily programme of patients. All patients at the centre should have a centre doctor supervising and planning their programmes from time of admission to discharge.

The ideal medical team contains a mixture of general practice and specialist experience, but the added common factor must be interest and ability in the techniques of rehabilitation. The successful rehabilitation centre doctor must think in terms of total disability and individuals as well as disease entities. He cannot afford to be a person with rigid ideas in medicine, or a person prone to lump all long-term problems into the comfortable categories of chronics, inadequates or malingerers. He cannot afford to have any fixed antipathies to ancillary professions. On the contrary, he must be prepared to study the techniques of ancillary professions sufficiently to prescribe intelligently in these fields.

The centre doctor's role is to lead casework, secure a full rehabilitation case history covering medical, social and vocational factors, prescribe a balanced daily programme from activities available and, by regular review, "step up" and intensify that programme. He holds regular staff conferences on individual patients and finally, with vocational services, plans disposal to training or placement on discharge. Every patient must feel free to consult him at any time on any problem, no matter how small. While a firmly directive attitude to treatment is essential, this at a rehabilitation centre is wrapped up in full explanation, regular encouragement and personal observation of the patient at work and play. A doctor who cannot work in this way is a failure as a rehabilitationist, no matter how successful he may be in other fields. In large measure the whole *tempo* and success of the programme stems from the attitude of the doctor attending the centre.

Nursing Services: Minor Treatment: Investigations.

Centres should all possess facilities for continuity in drug and dressing treatment, minor investigations, minor surgical procedures, application of plasters and other corrective work, bed nursing of patients with minor intercurrent illness, and emergency nursing for severe relapse or supervening injury while readmisison to a hospital is being arranged. Many rehabilitation units, in their efforts to dispel the hospital atmosphere, attempt to dispense with the services of trained nurses, substituting semitrained personnel chosen, it often seems to me, for their personality or devotion to good works. In my opinion, both these useful assets, together with sound nursing knowledge and capacity for sound medical observation, can readily be found in the right type of nurse for rehabilitation centre work.

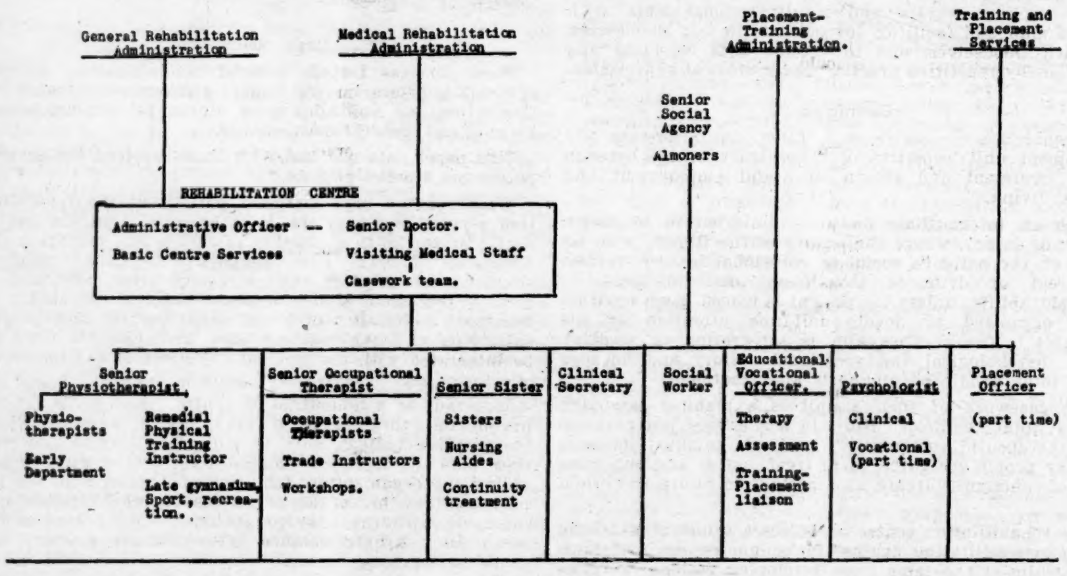

FIGURE I.

An important function of centre medical staff is the development of sound relations with the referring doctor or hospital. The centre doctor is the agent of the referring doctor in implementing and supervising the treatment programme. Referring doctors should make the general objective in centre referral clear and define the precautions and limitations of programme they wish observed. The centre doctors are responsible for setting up the programme in detail and its day-to-day supervision within the limits prescribed. The centre doctor amplifies and supplements the recommendations of the referring doctor, since the latter is seldom aware of the full facilities available, or the staff available for the job.

Patients should not be admitted unless referred by a hospital or private practitioner, or without the approval of that practitioner.

Patients should return regularly to their parent doctor for review, and there should be a regular exchange of clinical notes during progress and on discharge from the centre. Direct instruction of ancillary staff at the centre by referring doctors, without reference to centre doctors, is an unwise practice, as it breaks teamwork and control of the programme.

Medical management of rehabilitation centres by remote boards or committees is quite useless. Such bodies have their best value at policy and medical liaison level, but no sound rehabilitation centre can be run by remote medical control. Invariably, the most efficient centres I have seen are those with a full-time medical superintendent.

Nursing facilities should not be obtrusive, or be allowed to expand to a state where the job of the hospital is being usurped and the specialized rehabilitation functions of the centre are being neglected.

Many patients entering centres are still debilitated and in need of routine specific treatment. If that treatment cannot proceed at the same time as physical and occupational reeducative measures, half the value of a centre is lost. It is not practicable to return every patient with a minor problem to the out-patient department or home, if continuity of the remedial assessment programme is to be maintained.

The role of the right type of senior sister or matron is a most important one in centre life, particularly in centres dealing with mixed disabilities, both sexes and all age groups, including minors.

The nursing staff is responsible for implementing the following: orientation of patients to programme; allocation to suitable quarters; drug and dressing treatment; provision of special diets; general and medical welfare of patients; day-to-day observation of patient behaviour; parent substitution for minors and adolescents; day-to-day patient discipline; attendance at medical reviews; close liaison with centre lay administration on mutually related matters of patient leave, transport to leave and appointments, and reporting general indiscipline, such as abuse of alcohol, antisocial behaviour and the like.

The Physical Therapy Department.

Two standard subdivisions of the physical therapy department are recognized: (i) early remedial physiotherapy with physiotherapists, standard physiotherapy equipment and space for individual treatment and group activities; (ii) late remedial gymnasium, with remedial physical training instructor and staff, playing fields, hydrotherapy pool and outdoor physical recreations such as swimming, cycling and hiking.

A senior physiotherapist, responsible to the senior doctor, is responsible for all activities, the delegation being as follows:

Doctor → Senior Physiotherapist → Senior Remedial Physical Training Instructor

↓ ↓

Physiotherapists. Gymnasium Instructors.

Standards are: one physiotherapist for 25 patients; one remedial gymnast for 50 patients.

Under no circumstances should the early physiotherapy department and the remedial gymnasium be separate entities. Progression is through the early physiotherapy department to the late remedial gymnasium.

The early department provides specific individual types of physiotherapy deemed necessary. A rehabilitation centre should be able to provide any form of specific physiotherapy in general use. The keynote of centre physiotherapy is, however, treatment in disability groups. The working day of the department is split up into regular periods, during which patients with similar disabilities or similar physical therapy needs are treated together. Many groups remain constant, others form to meet a particular need and then disappear until the need again arises.

Doctors prescribe into these relatively fixed treatment groups and times. The programme for a group is often a mixture of individual treatment followed by routines common to all patients in the group. Nearly all centre disabilities can have the bulk of their basic physical needs covered by allocation to one or more group attendances throughout each day. Time is set aside each day for physiotherapists to concentrate on individual treatments not capable of being covered by group work. Massage and most forms of heating are a prelude to, not a substitute for, active efforts on the part of the patient. Patients stay in the early department as long as the supervision of a physiotherapist is necessary. Others go straight to gymnasium. Some attend both sections in the same day. As a general principle, once the primary disability is safe, and the basic principles of treatment have been taught, patients graduate to late remedial activities.

Here the principle of focal group exercise is continued and expanded with increased tempo and concentration on speed, rhythm and coordination.

All forms of resistance exercise, exercises for joint range, general muscle-building routines, posture and respiratory classes, walking reeducation, and caliper and amputee routines are covered by fixed group attendances. Ability to perform activities of daily living are tested and rated soon after the patient's admission to the centre. Repetitive practice of these activities continues throughout admission, and they are finally rated on discharge.

The day's programme commences with general exercises for all patients. This is a warm-up, a gathering point to commence the day, and a useful socializing measure. The daily programme ends with remedial sport and games, graded to physical ability and age, from sedentary or wheelchair games to active competitive sport. The value of remedial sport and games in physical reeducation cannot be over-estimated.

All centre physical therapy units should carry a hydrotherapy pool capable of taking small groups of patients for both specific treatment by the physiotherapists and more general exercises by the remedial instructor.

Group recreations, such as swimming, cycling and hiking, should be regular activities for selected disability groups.

The objective of centre physical therapy is: (i) to regain maximum physical function in minimum time, by all standard techniques of physiotherapy, group exercises, organized sport and recreations; (ii) to assess physical function in terms of capacity for daily living and capacity to perform manual work; (iii) to assess by individual and group measures the general attitude of patients to disability, work and play.

The Occupational Therapy or Work Therapy Department.

The occupational therapy or work therapy department bears little resemblance to the acute hospital occupational therapy department, either in facilities or in base functions.

Centre occupational therapy provides a full range of work processes from sedentary light trades to heavy workshops, such as carpentry, metal work, boot repairing, and light to heavy outdoor tasks, such as gardening, log-sawing and husbandry.

Occupations available must cover a full range of physical and mental work demands.

The objective of work therapy is: (i) remedial gain and return of maximum physical and mental function; (ii) assessment of residual mental and physical capacity for work, and stabilization of maximum work capacity by graded repetitive practice, teaching correct work method and adaptation of work techniques to overcome specific handicaps; (iii) study of work aptitudes; (iv) study of general attitudes to work, and their evaluation in comparison with general attitudes to work demanded by the normal working community.

Each shop should have a section for handwork and adapted remedial apparatus. Workshops should also conform as closely as possible to standard trade equipment and standard trade practice. Training for a specific vocation is not the task of rehabilitation centre workshops. Workshops, however, must be adequate and realistic enough to test the basic physical and mental demands of most common forms of work, and must be able to imitate, where necessary, attitudes and relationships generally found in industry.

The work therapy team is doctor-occupational therapist-trade instructor. All workshops should be medically supervised by a senior occupational therapist, responsible to the doctors for patient programmes.

The doctor outlines the type and frequency of work required, the medical objective of the work, the medical precautions to observe, and useful work adaptations. The therapist plans the implementation of work prescriptions, remedial adaptations and work times with the instructors. She observes progress and, after consultation, "steps up" work times and work demands. She must be constantly alert for medical deterioration, fatigue or boredom. Of importance are her observations on the group behaviour of the patient, his attitude to his disability and his disability attitude in relation to work. The therapist should not be tied down to teaching technical skills.

These last-mentioned are the responsibility of the trade or craft instructor. The instructor teaches skills and sound work practice within the limits of the medical prescription. He reports on workshop behaviour from the viewpoint of a tradesman. His observations on the patient's work aptitudes and general attitude to work are of particular value, as they are not conditioned by preoccupation with the natural history of the disability.

This doctor-therapist-instructor team approach to work assessment, each contributing according to his own background and knowledge, is the only sound method of covering all factors involved in converting severe disability to ability and will to work.

Assessment of general employability factors—such as drive, initiative, attitude to authority, capacity to retain instruction, capacity for teamwork, punctuality and ingenuity in overcoming handicap—are without doubt more important assessments in planning training or placement than assessment of specific physical or mental defects.

Long-term patients divide roughly into those who, despite severe handicap, possess general employability factors in marked degree. These people always work eventually, whatever their handicap. A centre's duty to them is to teach them how to work to maximum efficiency with safety, and to guard them against unnecessary downgrading.

The largest group are those who possess, in varying degree, the general employability factors necessary for success. Organized rehabilitation is the only sure method of saving many in this group from invalidism.

The final group fall short in every respect when their general motivation to work is assessed. In some, there was no genuine motivation prior to illness. In others, severe illness has destroyed what resolve was originally present.

The programme of the rehabilitation centre effectively salvages some of these cases. For others centre testing, at least factually, proves the basic nature of the deficiencies, and prevents future time and money from being wasted. In my experience they are rare.

The Educational Vocational Department.

The educational vocational department serves both medical and vocational interests, working closely with both remedial and vocational services under medical guidance. The duties of the unit include: investigation of past educational and vocational background; provision of sedentary intellectual tasks or studies for therapeutic purposes; provision of similar tasks to assist in work assessment; individual studies as necessary prerequisites to formal training; group studies and recreations for both treatment and assessment purposes, such as English classes, activities designed to socialize those withdrawn and unsure of themselves, and groups to help speech defect.

This department is the formal channel through which training and placement plans made by the team at the centre are related to official training or placement bodies affiliated with the centre.

Another useful function of this section is to procure information for other centre personnel on the specific demands of particular jobs or courses of training, information on the availability of certain types of jobs, or general information on trends in placement. This is secured from employers or from the placement agency supporting the centre's work.

This function is most important if centres are to avoid conditioning patients for impractical placements.

The whole centre team contributes to formulation of final plans for placement or training. The doctor, vocational officer and placement officer carry the final responsibility for this plan and its implementation.

Separation of remedial and vocational services in a rehabilitation centre is fatal. The doctor is the person best trained to assess the effects of disability in relation to capacity to perform any particular form of work. He must pass final judgement on the satisfactory nature of any projected job. As a general rule, the doctor's responsibility is a diminishing one as recovery becomes more stationary. It is diplomatic for him to assume a less-obtrusive role as time goes by, to assist in breaking dependency on disability.

There is, however, no stage of the rehabilitation process which should not be subjected to periodic supervision and guidance by the medical practitioner, if gain is not to be lost by medically unsound planning.

A medical prescription for work placement should cover the following: a brief outline of disability in lay terms; work travel and work environment restrictions; an outline of residual abilities for work; specific precautions to observe in placement; an outline from experience of patients at the centre of general employability factors, such as drive, aptitude and attitude; specific suggestions for placement, integrated with the patient's expressed preferences.

Disablement Training at a Centre.

Disablement training generally is not a function of centres. The discipline and routine of the training establishment or apprenticeship workshop is one other step closer to normal working than that provided at a centre. It is difficult for a centre, apart from lack of staff and facilities, to create two different community patterns successfully alongside each other.

Centres can, however, often teach sufficient basic abilities to enable direct transfer to semiskilled trades to take place without formal training. It is also sometimes of value to arrange short full-time or part-time attachments to employers for on-the-job training trial, with return to centre for final assessment. Despite the resources of a centre, cases arise in which doubts on medical and general capacity for work cannot be resolved without actual work trial.

Where remedial measures are lengthy and a training objective can be defined early, part-time attendance at the centre for treatment and part-time attendance at formal training is a time-saving and morale-building arrangement.

The Clinical and Vocational Psychologist.

Every centre should carry a visiting psychologist as a member of its casework staff. Early after admission of patients to the centre for certain disabilities, clinical psychometric testing gives valuable information on general intelligence level, behaviour pattern and other deviations from normal. The psychometric tests of the psychologist are not infallible, but neither are the intuitive judgements of intelligence indulged in by many doctors and other medical workers. The concurrent use of the psychologist's opinion and other forms of assessment is the best safeguard against faulty judgement. It is often of value to repeat tests throughout the stay of long-term patients. At a stage when vocational planning is indicated, the psychologist gives more specific vocational guidance. This opinion also should be integrated with assessments from other centre sources before the patient is counselled to a job. It is essential that the counsel of the doctor, the psychologist and the vocational officer be basically similar.

The Social Worker.

A social worker, who understands the social structure of the medical world and the early stresses to which the severely disabled patient and his family are subjected, is an essential full-time or part-time member of centre staff. She must liaise with hospitals and other agencies in securing early social background. No rehabilitation centre taking patients from hospital or home environment, and professing to condition these patients for return to work and the pre-illness environment, can hope to be successful without having one member of the casework team delegated to keep centre planning related to that environment. All centre planning must be conditioned to the predicted picture of the environment on the patient's discharge from the centre; or the family and environment must be successfully conditioned to keep pace with centre plans.

Where unsatisfactory environment or family attitudes exist, a decision must be made at the centre on whether return to that environment is inevitable or whether a total break can be planned and successfully implemented.

Where home environment is good, regular social worker visits should keep family and relatives fully appraised of progress. This aim is fortified by visits of relatives to the centre, and by regular home leave. Patients can be debilitated, not rehabilitated, by centres which fail to keep in touch with the true facts of the patient's background and social problems. Falling off in effort at the centre should immediately call for investigation of the commonest cause, social stress and strain acting from outside. Routine social background on all cases is not necessary.

The social worker's best routine is as follows: (i) to make herself known to all new patients and briefly outline her functions, and when and where she may be found; (ii) to take a brief domiciliary and sibling history, but avoid counselling until her role is more clear; (iii) to investigate and relate to doctors social problems voluntarily tendered by patients or relatives and seek guidance for

future action; (iv) to gather background and attempt adjustment of environment or attitude for problem patients referred to her by centre doctors. The good social worker will find her most satisfactory role in these last-mentioned referrals. The measure of success she achieves in securing improved conditions or attitudes is often a major factor dictating success or failure of rehabilitation.

The Placement Officer.

The ultimate success of any rehabilitation centre's work rests with medically sound, satisfactory placements.

The best morale-building placement is that found by the patient himself, guided in his search by his medical and vocational advisers. Self-placement helps to throw off the shackles of dependence on disability and of dependence on the centre. All centres should provide regular leave for job-seeking by patients, particularly those with good drive, intelligence and confidence in employer interview situations.

For many others the centre team must help in placement, and the trained disablement placement officer of the placement organization affiliated with the rehabilitation service is an essential element of the centre's casework team. Time must not be wasted in waiting to the point of discharge before bringing the placement officer into the picture. The transfer from centre to placement phase should be as smooth as the hospital to centre phase. Discharge to home to await nebulous placement action will almost certainly lose most of the gain made at the centre.

The placement officer should have full access to patients, remedial departments and remedial staff from the time of patients' admission. When the time comes for the placement officer to sell patients to jobs, he will do so with more confidence from having observed their early progress. Like the social worker, he can help considerably to keep centre planning related to the realities of the working community. As soon as the long-term prognosis for recovery is reasonably certain, he should play an active role at casework conferences.

Suitable placement opportunities for problem patients are often few and far between. It is often expedient to forgo fine points in recovery or adjustment in order to secure a placement not likely to occur again for many months.

Other patients can often be groomed while at the centre for placements, promised early and available on discharge.

Doctors should insist on personal escorting of all problem placements to potential job prospects, particularly patients of doubtful resolve or those with disabilities which present badly to employers. The centre doctor should at all times be personally available to the placement officer, and not deal through intermediaries or by paper referral only. If necessary, the doctor must be prepared to assist by visiting potential employers.

Cover-up of basic disabilities to employers never pays dividends. It is essential that residual abilities be matched closely to the demands of the job. For this, employer understanding is essential. Jobs secured only on a sympathy basis never last.

Medical Secretary and Medical Records.

No centre casework team is complete without competent secretarial aid. The long-term nature of casework and the number of units of the team make for bulky medical records. Centres also carry heavy outside clinical and other correspondence. The value of the clinical secretary, in cutting the paper work of doctors and releasing them for clinical work, is still poorly implemented in many Australian medical institutions.

Sporadic Members of the Team.

Many other ancillary medical and lay people come into the work of the centre for individual case requirements—for example, the speech therapist, the teacher of deaf, blind or retarded children, the acoustics laboratory, the limb and splint maker, voluntary agencies, welfare workers, housing officials, union officers and employer organizations.

These, and many others, enter into casework for specific problems. It is an axiom in rehabilitation that the casework team is as large or as small as the total problems involved. Restriction of horizon at a centre to the bounds of its permanent facilities will soon stamp it with the hallmark of mediocrity. Responsibility rests with the medical staff of the centre to set an example, by seeking and taking advice widely, both inside and outside medical circles.

Day-to-Day Organization and Case Work Management at a Centre.

Admission criteria are as follows: full agreement between patient or relatives, parent treating doctor and rehabilitation medical services; a long-term disability needing extensive ambulatory treatment, observation and adjustment, as a full-time job, if drift to invalidism is to be avoided; a reasonable chance, with rehabilitation aid, of sufficient recovery to engage in suitable full-time or part-time employment; existing arrangements prior to admission not covering all that might be done, or being applied too infrequently; centre admission not duplicating, less efficiently, facilities existing elsewhere; no marked antisocial or bizarre features to the case.

Some disabilities particularly amenable to rehabilitation centre regime are as follows: multiple fractures and injuries with extensive loss of function; severe head injuries; cases after some brain surgery; accident paraplegia, with some bowel and bladder training, no gross urinary infection, no extensive pressure sores, and some potential for wheelchair or long leg caliper ambulation; post-amputation states; congenital and childhood orthopædic deformities associated with severe loss of function, lack of education and no vocational goal; bone and joint tuberculosis; cases after plastic surgery with deformity; poliomyelitis with severe residual paralysis; some cases of cerebral palsy without major mental defect; some cases of arthritis (traumatic arthritis, osteoarthritis and rheumatoid arthritis with response to treatment, but need for a regular physical and mental supportive regime and resettlement planning); some long-term medical disorders, such as asthma, bronchiectasis, quiescent pulmonary tuberculosis, toxic work states, endocrine disorders, ulcerative colitis and the like (for general reconditioning, assessment of work tolerance and occupational resettlement); congenital and rheumatic heart conditions (for work tolerance assessment, training, and placement); post-cardiac infarction and hypertension (to teach new living and working standards and secure sedentary placements); mild epilepsy without mental deterioration; mild mental defect, compatible with simple repetitive work; some psychoses and neuroses in which the patients respond well to treatment, but need an ordered post-treatment regime to test the stability of recovery and careful control of return to work; problems of deafness, blindness and speech disorder, where existing services do not cover the total need; simple medical problems, where grossly adverse social circumstances are converting minor disability into total invalidism; stabilized disabilities presenting to employment agencies as recurring placement problems.

Centre Admission Routine.

It is necessary for a rehabilitation medical assessing service to collect a full rehabilitation history and forward case-papers prior to the patient's admission to a centre. These papers should carry interim instructions to the centre staff for a safe programme to commence immediately on the patient's admission. Patients invariably lose confidence in a centre obsessed with investigations and tardy in starting its programme.

The first day is spent in reception and orientation to the living and working units of the centre.

New patients, escorted by senior personnel, inspect the centre as a group. The skill of this staff member (usually the senior sister) in outlining the functions and daily programme of the centre can greatly influence the patient's

future attitude to his programme. The majority of patients who reject trial at a centre do so in the first few days.

The predominant impression the patient must receive is: "These people know their job, they act as a team, and they are all personally interested in me as an individual."

The staff attitude to all new arrivals must be the same, and not conditioned by past history. Patients should know that they will be assessed on their performance during rehabilitation, not on their past record.

It is useful for the patient amenity committee at the centre to elect patients also to welcome new arrivals to the patient fraternity and community centre activities.

On the day after the patient's admission to the centre the daily programme should commence.

The Centre Doctor's Medical Review.

The centre doctor, in his medical review, amplifies the medical, social and vocational history, carries out a full examination, sets out the amplified daily programme of physical, occupational and educational pursuits, gives instruction for continuity drugs, dressings and general nursing observation, and, finally, directs further investigations by members of the casework team, the general objective for the case and precautions to observe in management.

Ease of prescribing is assisted wherever possible by dividing activities into group attendances at set times.

Medical review is weekly, with weekly changed programmes posted in all sections. Programme details are fixed at a weekly staff discussion.

The final programme for each individual must be balanced, have no short useless periods and have no proximity of heavy physical activities.

There is a morning roll call at general exercise class. No absence from programme is overlooked, and an explanation is always requested. Suggestions by patients for changes in their own daily programme are encouraged and implemented if medically sound.

Wherever possible a full remedial day of five or six hours is desirable. A few restricted programmes (for example, half a day) may be permitted, but a rehabilitation centre should not admit patients for single treatment measures, leaving such patients wandering freely to upset the discipline of others.

Patient exhaustion by over-interviewing and patient confusion by conflicting advice are two recurring problems at centres to be controlled by sound medical management and sound teamwork. It is most important that a general attitude to each patient be defined and closely followed by all staff.

The Basic Principles of Centre Treatment.

Specific remedial routines for physical and mental recovery, assessment of specific abilities and aptitudes for work, and assessment of general social and work attitudes must run through the programme of all sections.

Care must be taken to ensure that centre programmes specialize in rehabilitation functions and avoid frank hospital roles.

Medical investigations are limited to those necessary for checking treatment and prescribing an active programme with safety.

Continuity Casework Management.

Changes of programme always attempt to increase the time and demands of any activity. Steady progression is the keynote. Constant encouragement and congratulation on even the most minor gain are essential, while at the same time the patient is exhorted to greater efforts.

Passive, comfortable, individual treatment must be abandoned and replaced by active individual and group treatment wherever possible.

Physical therapy programmes should naturally progress from the early remedial department to the gymnasium. General exercises should be graded through light, medium and heavy. Sports should be graded from sedentary to intermediate and late, occupational therapy from light trades to heavier indoor or outdoor work, and education from simple intellectual pastimes to set study under supervision. Progression brings allocation to centre daily chore rosters. Where workshops allow individual project work, sooner or later work should be introduced on group projects to help the centre, other patients or other institutions. Medical leave should increase as a reward for progress. At day attendance centres patients should progress from special to public transport. Patients revealing leadership should be given opportunity to practise that leadership. Patient amenity committees should give opportunity for self-organization and expression, and redevelopment of social conscience. A similar attitude of progression to responsibility and self-sufficiency should pervade the activities of the living wing of the centre.

Regular patient staff conferences are held by doctors, particularly on problem cases. Free discussion at these talks is the rule. All members must sink their individual opinion when discussion is complete, and adhere to the final group decisions of the casework conference. There is no place for rank individualists, no matter how skilled, on a rehabilitation centre staff. There is, further, no place for sectional insularity. Every department has a working knowledge of the techniques and routines used in other departments.

Full conferences of all casework staff are held by the senior doctor for critical review of centre techniques, case results and developments.

End-Results of Rehabilitation Centre Treatment.

The figures in Table I are from residential and day attendance centres of the Department of Social Services in Victoria over a period of twelve months. The number of cases reviewed was 220 (male and female subjects). The age range was from sixteen to fifty-five years. The disabilities were mixed and of the type outlined in this paper. With regard to severity, 34% of patients were invalid pensioners; 66% were working men and women receiving a sickness benefit and unfit for work for periods varying from sixteen weeks to two years prior to admission to a centre—assessment of these patients revealed a threat of permanent invalidism, but a potential for return to useful employment in all cases. The average stay at a centre was: residential, seven months; day attendance, five months.

TABLE I.

Classification of Patient.	Total Patients. (Percentage.)	Invalid Pensioners. (Percentage.)	Sickness Benefit Recipients. (Percentage.)
Returned to work on discharge (follow-up of placements shows 90% stability)	55	36	63
Fit for work on discharge; awaiting placement (all but one placed subsequently)	4	3	4
Discharged to full-time or part-time training (average loss during training, 4%; of those completing training 97% get jobs)	17	33	10
Discharged from centres for disciplinary reasons (approximately 50% of these return to work; rehabilitation centre helps some, is useless for others)	6	6	7
Medical state deteriorated (rehabilitation abandoned or deferred)	8	7	9
Left against advice; pressure by relatives; unpaid domestic duties; married; left, not traced; fit to work, but inadequate (approximately 25% of these found to be subsequently working; 50% improved in some way by rehabilitation trial)	10	15	7

THE PROBLEMS OF MALARIA IN NEW GUINEA.[1]

By CARL E. M. GUNTHER, M.D., B.S., D.T.M. (Sydney), D.T.M. and H. (England),
Sydney.

NEW GUINEA and its associated islands together make up an integral geographical unit. Ethnologically this unit is homogenous, since it is populated by the Melanesians in the north and by the closely-related Papuans in the south. Even politically, though it consists of Netherlands New Guinea to the west, the Australian Territory of Papua to the south, the Australian Trust Territory of New Guinea to the north, and the British Solomon Islands Protectorate to the east, it must inevitably be regarded as a single conglomerate unit. Identical malaria problems exist throughout the whole area. There is a close and efficient liaison, especially in health matters and malaria control, between the Dutch and Australian administrations, and some linkage between the Australian and British authorities.

Most of the area is mountainous, rugged and inaccessible; it has a heavy rainfall, and is covered by dense tropical jungle. It has a total native population of over 3,000,000; there are over 20,000 Europeans distributed throughout the whole area; and there are 15,000 Asiatics, mainly in the larger centres of the Trust Territory. The natives are primitive, many of them still with a stone-age culture; they live in isolated, self-contained villages; their organization is loosely tribal, but in effect rather more in the nature of large family communities, to which each member is strongly attached. They are, within their limits, an intelligent people.

The fundamental problem in New Guinea is to devise means of lifting from the natives the crushing burden of malaria, which has been for countless generations the main factor in holding them back from the considerable degree of development of which they are undoubtedly capable. Malaria causes innumerable miscarriages and stillbirths and foredoomed premature births; it is responsible for high maternal mortality and much maternal morbidity, and a tragically high infantile mortality rate due mainly to cerebral malaria in the first year of life. By the age of about eighteen years, the native has a malaria-stimulated colossal overgrowth and thickening of the spleen, which throws a monstrous burden on a circulation already struggling to keep the body supplied through a blood-stream vitiated by anæmia due to repeated attacks of malarial fever. By his early twenties he is slowed down by physical and mental inertia, his resistance to other diseases is dangerously lowered, and he is already well on his way to premature old age. The women, with the added burden of incessant pregnancies from the time they reach puberty, age even earlier than the men. It says much for the basic sturdiness of these people that they have managed to survive, and even thrive, in their harsh and difficult country, in spite of malaria; it is encouraging to see how they shoot ahead when they are given even a small measure of protection from malaria and a little assistance with general medical care and improved living conditions.

Malaria and its Vectors.

Plasmodium falciparum, *P. vivax* and *P. malariæ* are everywhere present; *P. ovale* has been reported, but on its rare appearances it can be considered as behaving exactly as *P. vivax*. Malaria occurs up to the 6000-foot level, but there are many natives living at 4000 feet who are at present entirely free from the disease. There are two important vectors, *Anopheles punctulatus farauti* Laveran, 1902, and *A. punctulatus punctulatus* Donitz, 1901. Both vectors breed in still, shallow collections of water exposed to direct sunlight for several hours daily; *A. farauti* will breed not only in pools of fresh or brackish water, but also in natural containers such as coconut shells, whereas *A. punctulatus* breeds only in fresh water in earth pools. The significant point is that breeding places are shallow and exposed to sunlight—which means that every phase of human activity in New Guinea tends to multiply breeding places, since every form of activity commences with cutting down the jungle, disturbing the soil, and letting in the sunlight. Under these circumstances larval control is unpractical; naturalistic methods are impossible, and spraying with oil or Paris green is not effective, since rain falls every few days in most districts and there may be a dozen healthy larvæ in every deep footmark. Even if spraying was effective, the cost would be prohibitive, since the vectors have a flight range of at least a mile. For the same reasons, spraying with insecticides would be nearly as ineffective, added to which there is the increased risk of rapidly developing resistance to the chlorinated phenolic insecticides when they are used against larvæ. The answer to the problem of vector control must therefore be residual spraying of all dwellings with insecticides. In any case, this appears to be the only practicable means of attacking malaria in the villages, as consideration of the other aspects of the problem will show.

Apart from measures aimed at destroying mosquitoes, antimalarial measures can be divided into three sections: protection against mosquitoes, drug prophylaxis and treatment of malarial fever.

Protection against Mosquitoes.

The only really worthwhile measure of protection against mosquitoes is the screening of dwellings. To protect all windows, doorways and ventilators with wire gauze adds less than 4% to the cost of constructing a European-style house. This measure is available to the Europeans and Chinese, but to the natives its cost would be prohibitive, and in any case their houses and the materials of which they are built do not lend themselves to mosquito-proofing.

The use of mosquito nets is not a satisfactory alternative to screening houses, but properly carried out it gives a lot of protection. Protective clothing and repellents are useful temporary expedients in special circumstances, but their employment cannot be recommended as a general measure of any value.

Drug Prophylaxis.

As a general principle, it can be stated that malaria-tolerant people do not need drug prophylaxis, while non-tolerant people most emphatically do. All natives in the endemic areas are highly tolerant of malaria—they have had innumerable attacks of malarial fever and are, in fact, alive at all only because they have survived these repeated attacks and developed a massive tolerance. Native infants are, of course, not tolerant, and the infant mortality rate from malaria has been variously estimated as 8% and 20%; actually, a not unlikely explanation for the survival of so many of them over their first year is that they inherit from their mothers some degree of immunity which sees them through early attacks of fever, provided these are not too severe. Surveys have shown that there is a high infection rate at seven months; in many parts there is a child spleen rate of 80%, and although the parasite rate declines at an early age, the adult spleen rate remains at 70%. These rates indicate an unusually high transmission rate throughout the whole year, which in turn is an expression of various factors, the chief of which are the well distributed annual rainfall, the absence of a specific cold season, and the short-term relapse rate of the local strains of parasites.

The Chinese can also, for all practical purposes, be regarded as an indigenous malaria-tolerant group. Nearly all of them are native-born, for there has been almost no Chinese immigration into New Guinea for the last forty years. They are sensible people, and well informed about antimalarial measures and their value, and they

[1] Read at a meeting of the Section of Tropical Medicine, Australasian Medical Congress (British Medical Association), Ninth Session, Sydney, August 20 to 27, 1955.

are well able to afford them. They apply these measures adequately enough to minimize malaria, so that they have acquired a moderate tolerance. Of all the people in New Guinea, the Chinese probably present the fewest malaria problems.

Few Europeans develop any tolerance at all. Because of their high susceptibility they need to take advantage of all possible antimalarial measures. Yet no more than 20% of European dwellings are screened, and perhaps 5% are sometimes residually sprayed; and no more than 75% of Europeans take prophylactic drugs regularly and in sufficient dosage. The only problem is to persuade the Europeans to make full use of the measures so easily and so cheaply available to them. I have no hesitation in stating that almost all malaria among Europeans in New Guinea is due to their own carelessness or stupidity in this respect.

The non-tolerant natives in non-endemic areas present a double problem. As these areas are opened up, malaria moves in, even well above the 5000-foot level. Fortunately the invasion is slow, and in the course of developing these areas the Administration brings in its medical services, so that the impact is lessened; serious epidemics do not occur, and in a few years the natives will become moderately tolerant. A secondary effect is that once such areas are opened up, many thousands of non-tolerant natives go down to work in the hyperendemic areas. Some twenty years ago I estimated that such natives, when not given prophylactic drugs, lost one-third of their possible working time through malaria, and although none died during a six-month observation period, at least 9% died after they returned to their villages. Even when similar groups are given the modern prophylactic drugs they suffer from as much fever as do the highly tolerant local natives who are not given any prophylaxis at all. However, nowadays infected natives returning to their villages after a sojourn in endemic areas are followed up and treated by the medical services; moreover, the modern drugs eradicate falciparum infections, so that deaths are unlikely to follow.

The Malarial Cycle.

Consideration of the antimalarial drugs will be simplified if the malarial cycle is first briefly recapitulated. When gametocytes are taken up by the mosquito, fertilization occurs and the zygote encysts within the stomach wall. When the sporozoites emerge many of them enter the salivary glands, whence they are introduced into the victim's blood-stream at the next feeding. They circulate for some thirty minutes (Fairley, 1945), then enter the liver and develop into primary exoerythrocytic forms, which rupture and release thousands of vegetative merozoites (Shortt *et alii*, 1948). These enter red blood cells and commence their repetition of erythrocytic cycles; some ultimately develop into gametocytes. In *P. falciparum* no further cycle occurs, so that once the erythrocytic forms die out or are destroyed the infection terminates. In the other species, however, secondary exoerythrocytic cycles occur, giving rise to successive cycles of erythrocytic forms, and not until all the secondary exoerythrocytic forms have died out or been destroyed does the infection terminate. Each erythrocytic cycle, and the secondary exoerythrocytic cycle, are self-limiting even when not treated, dying out after a number of generations, provided always that the host lives so long. There is evidence that the heavier the initial inoculation, the longer the infection persists and the larger the dose of prophylactic drug needed to control it (Coatney *et alii*, 1950). Myatt and Coatney (1954) state that some very light vivax inoculations result in inadequate primary exoerythrocytic cycles, which do not go on to secondary exoerythrocytic cycles.

Antimalarial Drugs.

The 8-amino-quinolines, in concentrations reached only through highly toxic doses, destroy the vegetative erythrocytic forms; in fairly safe doses they destroy exoerythrocytic forms and gametocytes, but they are far too toxic for general or prolonged use as prophylactics.

Quinine rapidly destroys the erythrocytic forms of all species; it completely suppresses *P. malariæ*, and when taken for long periods appears to inhibit its exoerythrocytic forms. This statement is based on my own observations extending over ten years' use of quinine prophylaxis and nine years' use of mixed prophylaxis in a stable community under good medical control. When quinine was used no *P. malariæ* whatever was seen, and none developed after quinine was discontinued; with any other drug *P. malariæ* appeared more often than the other two species combined. However, quinine is only moderately effective in suppressing *P. vivax*, and is inefficient and dangerously capricious against *P. falciparum*, especially the New Guinea strains.

Mepacrine is an excellent suppressive of all species, especially *P. falciparum*, except for the New Guinea "Wewak" strain. However, it is relatively toxic in adequate doses, and it stains the skin yellow. It did yeoman service in the last war, but it has been superseded by the newer drugs, and now has no place in prophylaxis or treatment.

Proguanil and pyrimethamine suppress *P. malariæ* poorly and *P. vivax* completely. Against *P. falciparum* they are true causal prophylactics, in that they destroy the exoerythrocytic forms. In addition, they appear to inhibit the exoerythrocytic forms of *P. vivax*, and perhaps even kill them after prolonged administration, since on occasion known infections have not recurred after cessation of prophylaxis. On the other hand, the quantitative effect described by Myatt and Coatney (1954) may have been the determining factor here. Alone of the available drugs, they have the valuable property of preventing gamete and zygote development in the mosquito. Proguanil itself is not malaricidal (Hawking and Perry, 1948); the active principle is a metabolite, a triazine compound (Crowther and Levi, 1953) ten times more potent than proguanil. Proguanil is only partly metabolized, and 45% of it is excreted unchanged within four days, whereas the triazine metabolite appears to be rapidly excreted, and it is possible that its effect is too evanescent for it to be efficient as a general antimalarial drug; the administration of proguanil, with its slow excretion rate, ensures a continuous supply of the metabolite for several days. This triazine metabolite is remarkably similar to pyrimethamine, but pyrimethamine is very slowly excreted, an effective concentration being maintained for at least seven days. In normal doses neither of these drugs is toxic, but in overdoses pyrimethamine causes coma and death, whereas proguanil causes only crystalluric hæmaturia, with no permanent damage (Gunther, 1954). Pyrimethamine is almost tasteless, whereas proguanil is rather bitter, but this is of little advantage (Gunther, 1954). These drugs are by far the cheapest on the market.

Under abnormal and unsatisfactory conditions of administration, notably when single small doses are given, as in mass campaigns or when people experiment with sporadic self-treatment, parasite resistance to these two drugs may develop. This risk may be greater with pyrimethamine than with proguanil, because of the persistence of the former in sublethal concentrations for long periods (Davey, 1954).

The chloroquine group, amodiaquine and chloroquine, destroy only the erythrocytic forms—they do not kill the exoerythrocytic forms of *P. falciparum* or inhibit those of *P. vivax*. Nevertheless, when used prophylactically or to treat an overt attack of falciparum fever, they are so efficient that they terminate the infection. I once treated 12 non-tolerant patients with a single dose of 600 milligrammes of amodiaquine, and found that in 10 with either falciparum or vivax infections there were no parasites left after forty-eight hours. Of two infections with *P. malariæ*, one was cleared after sixty hours, but in the other case the parasitæmia persisted for seventy-two hours, and was then cleared in twenty-four hours with quinine. These drugs are not toxic in normal doses, though in a series of 25 cases I found that amodiaquine caused brisk purging in three. In a pregnant woman, between 1·5 and 3·5 grammes of chloroquine caused double vision, dizziness,

vomiting, depressed respiration, anorexia, and paræsthesia with analgesia of the face and neck; recovery was complete in thirty-six hours, with no adverse effect on the pregnancy (Kjaer, 1955). These drugs have not been reported as causing resistance. They have no effect on gametocytes, nor do they inhibit gamete or zygote development. They are bitter-tasting and relatively dear.

An important feature is that when they are first administered the chloroquine radical is almost entirely taken up by the tissues, mainly by the liver, almost none being left in the circulation. A large initial loading dose is therefore necessary if prompt action is required (Myatt and Coatney, 1954). One result of this is that when intermittent doses are taken for prophylaxis very little is excreted in the milk of a lactating mother, so that nurselings do not receive an effective dose as they do with the other drugs. Consequently, if the mother takes chloroquine or amodiaquine, her infant must be given some too; alternatively, it is simpler for the mother to take proguanil or pyrimethamine while feeding the infant (Gunther, 1953).

The choice of a prophylactic drug, then, lies between proguanil or pyrimethamine on the one side and chloroquine or amodiaquine on the other. A point often argued is whether a drug which must be taken daily is as convenient as one that needs to be taken only once, twice or thrice a week. My preference is overwhelmingly in favour of the daily dose; it is much easier to maintain a small daily routine than an intermittent one, and an occasional missed dose leaves a much smaller gap in the daily sequence than in the others. This argument alone makes proguanil the favourite; the toxicity of pyrimethamine in overdoses and its slow rate of excretion leading to a greater risk of developing parasite resistance are further against it. Its only benefits are its tastelessness and its cheapness—52 doses cost 8s. 8d., while 365 doses of proguanil cost 15s. 3d., which is a very small difference. As between proguanil and chloroquine, I kept one-quarter of a European population of some 700 on 250 milligrammes of chloroquine diphosphate three times a week, at a cost of 47s. 10d. per year per adult, and the remaining three-quarters on 100 milligrammes of proguanil daily at a cost of 15s. 3d. I found each as effective as the other. However, besides being so much cheaper, proguanil has its effect against gametes and zygotes, its capacity for being excreted in maternal milk, its probable inhibitory effect on the exoerythrocytes of *P. vivax*, and its advantage of a daily dose. Amodiaquine is rather more expensive than chloroquine, and causes purging in 12% of patients.

For Europeans and Chinese and for non-tolerant natives in endemic areas, then, the prophylactic drug should be proguanil, in a dosage of 100 milligrammes daily. Children aged from six to fourteen years should take one-half of the adult dose, and from weaning to five years one-quarter. Nurselings need nothing if their mothers take their regular dose.

The next problem concerns tolerant natives working in industry. Though they are tolerant, they lose a certain amount of time because of malaria. Native labour is neither efficient nor cheap by Australian standards, and much lost time makes it extremely costly. Since in tolerant people a very little of any antimalarial drug will completely prevent malarial fever, the question of preventing loss of time by giving these natives prophylactic drugs has arisen. The difficulty is that if tolerant natives are given efficient prophylaxis for some years their tolerance, which as far as present knowledge goes depends on their maintaining a constant, suppressed infection, may be lowered, so that when they return to the uncontrolled conditions of their villages the results may be disastrous. I believe most strongly that until efficient malaria control is established, this is a serious risk which cannot be justified, especially as the disability suffered by tolerant natives over an attack of malarial fever is so slight. However, since this started not as a humanitarian problem, but as an economic one, here are some actual figures. During 1954, at Bulolo in New Guinea, I was in charge of an average of 926 tolerant native labourers (actually over 1800 individuals) who received no prophylactic drugs. During the year 226 of them were treated for malarial fever, with no deaths and with the loss of 788 man-days. The cost of treatment averaged 1s. per patient, and a man-day is worth 6s., so that the total debit against malaria was £248. But the cost of three 100-milligramme tablets of proguanil per week (which is an adequate dosage) for 926 natives would have been £301 for the year, exclusive of costs for distributing and overseeing. Actually, the figures for malaria, when compared with those for all other sickness — 1857 patients, with 8949 lost days, which represents 2·6% of all available man-days during the whole year — show that malaria was responsible for the loss of 0·23% of all available man-days, and for only 8·9% of all sickness. Economically, then, the loss of working time due to malaria among tolerant natives is negligible, and prophylactic drugs, even if they could completely eliminate loss of time, would not pay for themselves.

There is, however, one circumstance in which, if it could be organized, the giving of prophylactic drugs to tolerant natives would be not only justifiable, but mandatory. During pregnancy there are two stages at which malaria attacks in full force—during the period of morning sickness, when it causes many miscarriages, and during the eighth month, when it causes premature labour which results in either secondary uterine inertia and a complicated stillbirth, or a premature child with practically no chance of survival. If native women could be given light drug prophylaxis as soon as they are known to be pregnant, up till the weaning of the child, much maternal and infantile mortality and morbidity would be saved. Most emphatically this measure is not designed to eliminate malaria, thus reducing the mother's tolerance and preventing the baby from acquiring any — it is intended merely to soften the impact of malaria so that the mother will go on to full term and have a living baby, and the baby will not die before it has a chance to live. A dose of 300 milligrammes of quinine sulphate twice a week, or either 100 milligrammes of proguanil or 250 milligrammes of chloroquine once a week, should suffice. The problem is to organize this and have it carried out in the remote villages. However, probably there will be little need for such a scheme if residual spraying can be put into effect.

Non-tolerant natives in areas under invasion by malaria should not be given any prophylaxis. The invasion will be slow, and the medical services must be in action in such areas; treatment of attacks of fever as they occur will protect the natives and let them develop the tolerance which will be essential to their future well-being.

Finally, after serious consideration of my experience of malaria in New Guinea, I have lately come to believe that in that country, where *P. malariæ* is common and its appearances are increasing, the ideal prophylactic would be a combination of 100 milligrammes of proguanil with 150 milligrammes of quinine hydrochloride, taken daily. This would be a practical and convenient measure only if the two drugs could be combined in a single tablet.

Treatment of Malaria.

The first problem in treatment concerns the degree of cure at be aimed at. Tolerant patients should be given the minimum amount of treatment necessary to secure clinical cure, since massive treatment might lower their tolerance; they are not prone to suffer recurrences. Non-tolerant patients who will be remaining in malarious areas, and hence will be exposed to reinfection, also need only clinical cure, but their treatment must be heavier and longer, since their lack of tolerance leaves them open to recurrences if the current erythrocytic cycle is not thoroughly cleared out. However, patients who are leaving malarious areas should have all latent exoerythrocytic infection completely eliminated as soon as possible after they have ceased to run the risk of reinfection.

The tolerant patient needs only a very little treatment to secure clinical cure free from recurrences—on him even proguanil and pyrimethamine, which are very slow to act

in non-tolerant patients, act rapidly. On the other hand, too little treatment, at least with proguanil and pyrimethamine, has led in other countries to the development of resistant strains of parasites. For this reason, while a moderately large single dose of most of the drugs will often produce complete clinical cure, and such treatment will sometimes have to be used in special circumstances, it is better avoided. I have found the following courses to be effective in tolerant patients for all species of parasites, and after many years of their use I have found no evidence of the development of resistance: quinine bihydrochloride, 900 milligrammes daily for three days, cost 1s. 7d.; mepacrine, 300 milligrammes daily for three days, cost 1s. 6d.; chloroquine, 500 milligrammes daily for two days, cost 1s. 3d.; pyrimethamine, 75 milligrammes daily for two days, cost 1s.; amodiaquine, 200 milligrammes daily for two days, cost 10d.; and proguanil, 300 milligrammes daily for two days, cost 3d. The only difference between them is one of cost.

Moderately tolerant people, such as the Chinese, or natives in hypoendemic areas, need the same degree of treatment as non-tolerant people.

If non-tolerant people used all the antimalarial measures available to them there would be practically no malaria among them. But many of them are completely careless, and there are even now large numbers of Europeans who are still "faithful" to quinine or mepacrine, and who do not even take these regularly. On full dosage of quinine, and on intermittent dosage of any of the others, all species of parasites (except *P. malariæ*, with quinine) may break through; on such occasions the partial effect of the modern drugs may so modify symptoms and perhaps reduce the numbers of circulating parasites that prompt clinical diagnosis, and even thin-film diagnosis, may be rather difficult; examination of a thick film stained by Field's method is essential for absolute certainty. The only reason for missed diagnoses in malaria is failure to include it in the differential diagnosis, and I consider it an unbreakable rule to regard as potentially malarial every patient who suffers a rigor or who has a raised temperature, until it can be proved otherwise. Once the diagnosis is made, treatment is very simple. Chloroquine, preferably as the diphosphate, is the drug of choice. Amodiaquine is equally efficient, but sometimes causes purging. Proguanil and pyrimethamine are far too slow, dangerously so in falciparum infections. Quinine, mepacrine (Gunther, 1938), the 8-amino-quinolines (which do not kill erythrocytic forms in therapeutic doses) and possibly proguanil (Gunther, 1951), may precipitate blackwater fever in falciparum infections. The dosage of chloroquine is 500 milligrammes three times on the first day, then 250 milligrammes three times a day for the next three days. If the species has been identified as *P. malariæ*, 300 milligrammes of quinine bihydrochloride three times a day should be added from the beginning; with the other species, if there is a second rigor or even a considerable rise of temperature, or persistent parasitæmia after forty-eight hours from the commencement of treatment, 300 milligrammes of quinine three times a day should be added. If there is coma, vomiting, diarrhœa, gastritis or achlorhydria to prevent oral administration, or absorption, 600 milligrammes of quinine bihydrochloride should be injected, and this should be repeated once if necessary; oral treatment should be begun as soon as possible. If the peripheral circulation is brisk, the quinine should be given in two millilitres of water, intramuscularly; if the circulation is sluggish, the quinine must be diluted in 20 millilitres of water and given very slowly by the intravenous route. The intramuscular injection of mepacrine is equally effective, but mepacrine has no advantages over quinine, and is not readily available; an injectable chloroquine salt is now on the market—I have no experience of its use.

It is when people leave a malarious country for good that the 8-amino-quinolines come into the picture. Of these, primaquine is the least toxic. Such people should continue to take their prophylactic proguanil for at least three weeks, but preferably for six weeks; there are then two courses open to them. If there is good reason to suspect that they may be carrying a suppressed infection of *P. vivax* or *P. malariæ*—if, for instance, they have recently had an attack of fever, or if they confess to having been careless with their prophylaxis, or if they are so badly debilitated that the risk of overt malaria should not be run—they should be given 10 milligrammes of primaquine diphosphate with 300 milligrammes of quinine bihydrochloride three times a day for two weeks. Otherwise, they may wait and see if an overt attack develops, and then take chloraquine, followed by primaquine and quinine. With the long-term relapse types of *P. vivax* which occur in temperate climates (the Korean strain, for instance), the quinine is not essential, but with the New Guinea short-term relapse type and with *P. malariæ* it is most necessary. The 8-amino-quinolines cause a certain amount of methæmoglobinæmia, even in this small dosage, and elderly or debilitated patients should be kept at rest and under medical supervision while taking it. Negroid races are much more susceptible to this effect, and although there is no information in this respect concerning Melanesians and Papuans, they should be closely watched if they have to be given primaquine.

There remains only the problem of native infants in endemic areas. If chloroquine or quinine could be made available in short courses for them, then falciparum fever with its threat of cerebral malaria could be controlled.

It will be noted that throughout this discussion I have advocated frequently the use of quinine—that dangerous and outmoded drug, if current literature is to be believed. But if, fifteen years ago, quinine could terminate an attack of malarial fever in forty-eight hours, no matter what the species or how great the intensity of the infection, then it can do it today, and no other drug can do more. Moreover, my observations have led me to believe that it is far more effective against *P. malariæ* for both prophylaxis and treatment than any other drug—and current literature has nothing to say on this point. Its danger lies in its outstanding capacity for precipitating blackwater fever in falciparum infections; in my experience, most cases of blackwater fever occur when foolish people first induce in themselves the pre-blackwater fever state by intermittent quinine prophylaxis and inadequate quinine treatment of attacks of fever, and then precipitate the actual condition by taking a large dose at the wrong time. Among New Guinea natives the question does not arise in any case, since they do not suffer from blackwater fever. In my opinion quinine is an efficient and useful drug, and carefully used, a safe one.

Malaria Control in the Villages.

It has been truly said that no country with a malaria problem can afford not to solve it. Australia has such a problem in New Guinea, and it is a huge one. To lift the burden of malaria from the native peoples, efficient and permanent control must be extended into every remote village, where communications are by rough, steep, narrow and hazardous mountain tracks over which 15 miles of hard up-and-down going is an exceptionally good day's march; where all supplies must be carried in fifty-pound packs, and three-quarters of every load must consist of food. In the remote villages there is no existing organization on which the machinery of a malaria control campaign could be grafted—stone-age natives are not capable of easily grasping the conception of disease and its transmission, and their continued cooperation in matters which do not produce immediately visible material benefits cannot be expected. So the need for constant control and supervision of all details of antimalarial work must be anticipated. The instruments of all detailed work must be natives—there is no possible prospect of securing a large enough white staff under the Australian system of economizing on the salaries of experts—so that the first task is to select and train suitable native staff. The organization of each village is very tight and self-contained, and in practice the managing of any activity in a village must be in charge of a member of that village if the work is to be done effectively. The Administration already has in action, for the more accessible villages, a system of select-

ing and training intelligent and reliable natives as medical orderlies; altogether there are nearly 800 aid posts throughout the Territories; and it should not be hard to include malaria control workers in this scheme. The Malaria Training School at Minj, in the Central Highlands, has already started this work, in a small but very adequate way.

The most effective method of widespread malaria control is that of residual spraying. In any case, as I have shown, this is the only method which is likely to succeed in New Guinea. It is essentially simple and relatively cheap, and can be put into operation without elaborate equipment or skilled operators. It depends on the fact that the critical point in the transmission of malaria is when the mosquito feeds on man; at this point an infected mosquito transmits the disease to man, or itself acquires a fresh infection by taking up gametocytes from man; at the same time it takes up the blood without which it cannot go on to develop its eggs. Once it has fed, there is an interval before it needs to feed again and before it can become infective or can lay its eggs. Thus any mosquito which enters a sprayed house to feed, and which receives a sufficient dose of insecticide by alighting on the sprayed surfaces, will die before it can do any further damage. If transmission can be broken in this way, the disease can be controlled. In some countries where residual spraying has been used, the vector has been eliminated; in others, although the vector has survived, transmission has been interrupted for long enough to eliminate the disease. In at least two instances poor results have been obtained because the vectors do not rest for long enough to receive a lethal dose of insecticide.

I practised a modified system of residual spraying in a small area in New Guinea for nine years with considerable success. Unfortunately official opinion was influenced by conflicting reports that the vectors did not rest in houses, and spraying was not generally used; however, recently the Dutch in Netherlands New Guinea have carried out a series of observations and experiments which confirm the value of residual spraying, and, despite the fact that the vectors are outdoor as well as indoor feeders, and feed and breed all the year round, there is every prospect of success if a general campaign can be maintained for long enough. The one condition is that an effective film of insecticide must be maintained in all dwellings, all the time, for perhaps four years; the actual time will be determined by making regular malaria surveys to ascertain when transmission has been properly broken. If a lethal film is not maintained, or if spraying is continued unnecessarily long, there is a risk that resistance may develop, and unfortunately when resistance to one of the chlorinated hydrocarbons develops, it will appear very shortly against the others; it has been shown that once resistance to DDT appears, it will appear also against "Dieldrin" in six months.

The standards normally laid down for residual spraying are to apply DDT at the rate of two grammes per square metre every four to six months, "Gammexane" at 0·2 gramme per square metre every three months, or "Dieldrin" at 0·5 gramme every eight to twelve months. For hard, non-absorbent surfaces, such as are found in European-type houses, solutions or emulsions are best, but for the soft, absorbent surfaces usually found in native houses wettable powders must be used. In screened houses the best and most economical method is to paint all wire gauze every six months with a saturated solution of DDT in dieseline, which gives a thicker and more persistent film than the other usual solvents.

It can be expected that some areas will lag behind the others, for various reasons. Regular surveys will be needed to keep a check on this. When it happens, anti-malarial drugs will have to be used to bring the stubborn areas into line.

Two Final Problems.

I trust that I have not failed to indicate the magnitude of the task of establishing residual spraying in New Guinea. It will be not only a hard job, but a long one. Some areas have not yet been even seen by white men, and many are not under any form of control at all. If universal spraying could be established in the next five years, that would be a great achievement. If in a further five years transmission could be broken, that would be another great achievement. Thereafter a generation of natives would grow up with more vigour, a greater capacity for development, and a longer expectation of life. From that point a considerable increase in population could be expected. Then, since these are a primitive people, living by a limited, primitive system of cultivation, they must be taught better methods of agriculture and be provided with better crops, so that the increasing population may eat.

In the course of this programme two possible catastrophes can occur. New Guinea shares the risk of the first with the rest of the world—it is the risk that through slovenly half-measures, widespread insect resistance to the chlorinated phenolic insecticides may be developed. If this happens, we have available at present only substances that are at least as toxic to man as they are to insects. The second is that once any programme of malaria control has progressed far enough to reduce materially the tolerance of the population to the disease, we are riding the tiger and dare not dismount; there can be no halt in the programme, no turning back. What happened in Ceylon in 1935-1936 and in Malaya during the Japanese occupation would be repeated in New Guinea on a much greater and more devastating scale. This brings us to our final problem. Australia has a moral obligation to develop the native peoples of New Guinea. Incidentally, development of New Guinea is essential to the defence of Australia and will also give Australia all she needs in the way of tropical products at a reasonable price. A primary essential of any scheme of development is control of malaria. This will involve the expenditure of large sums of money for many years to come. New Guinea understands her problems, but Australia holds the pursestrings—this says, and leaves unsaid, everything pertinent to the problem. I do not wish to give the impression that I presume to speak for New Guinea; on the contrary, speaking wholly as an interested spectator who has seen quite a lot of this kind of game, I feel that the final problem is how to be sure, in view of the capriciousness with which Australia has often treated New Guinea, that Australia will continue to make sufficient funds available every year until the task is completed, in spite of the inevitable absence of visible results for many years to come. As an example of the sort of thing that can and does happen, let me mention that in a section of Netherlands New Guinea, because of the proximity of oil wells and the cooperation of their owners, malaria has been already controlled by cheap massive oiling. This is a small section, and if control is lifted malaria will reinvade it rapidly; but already the home Government has demanded that expenditure on further oiling be stopped, because malaria is no longer present. All New Guinea understands that this is only some clerk at The Hague trying to do his duty according to his lights; but that does not make New Guinea any happier, because that is the sort of thing that is always happening. Some guarantee of continuance of funds, without interference by remote control, is needed to insure complete success for any scheme of control.

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THE PRESENT STATUS OF MALARIA CONTROL IN THE SOUTH-WEST PACIFIC AREA.[1]

By ROBERT H. BLACK,
School of Public Health and Tropical Medicine, Sydney.

FOR the purpose of this discussion the South-West Pacific area refers to the malarious islands of Melanesia—that is to say, Netherlands New Guinea, the Territory of Papua and New Guinea under Australian control, the British Solomon Islands Protectorate, and the Condominium of the New Hebrides controlled jointly by France and Great Britain—although it should be remembered that there are still foci of endemic malaria in the northern parts of Australia. I should mention here that I have worked on malaria problems in all the malarious territories of Melanesia and in Northern Australia in the post-war years.

From the time of first exploration and settlement in these island groups malaria has played a very prominent part in determining the outcome of these ventures. The Dutch were forced to abandon an early settlement established at Triton Bay in 1828, owing to the ravages of fever. The Germans were compelled to move their seat of government when localities became untenable because of the large amount of malaria. In Papua, the London Missionary Society had, by 1887, lost over one-half of its 200 Polynesian teachers and not one of them escaped the fever. In the Solomons and the New Hebrides, too, malaria took its toll in lives and chronic ill health amongst the early missionaries working in these groups.

Amongst the native population malaria imposes its burden, not only by causing sickness and death, but also by its social and economic effects. It contributes largely to a high infantile mortality rate, increases susceptibility to other diseases, and has been an important factor in depopulation in Melanesia. Malaria is a direct and indirect cause of malnutrition, and its presence has discouraged plans for the introduction of fish ponds and paddy rice which were designed to improve the diet of the native peoples. Acute and chronic malaria interfere seriously with schooling in a population in which education is now of prime importance. In these malarious areas social development projects which do not include malaria control from their commencement will not be as successful as in non-malarious areas. Finally, in this area where labour is in short supply, it has been estimated that the production of a working group would be increased by 25% if the workers were freed of malaria. Eradication of malaria would result in a more efficient labour force, more labourers would become available, and in a few years the increasing population would provide more workers for the development of these countries.

Until very recently there has been no effective rural malaria control in the South-West Pacific area. The great Robert Koch, at the turn of the century, attempted to eradicate malaria at Bogadjim in German New Guinea by administering courses of quinine; but, of course, the result was a failure. Urban malaria, on the other hand, has been controlled on several occasions with a reasonable degree of success. Even before mosquito transmission had been demonstrated by Ross, malaria was eliminated from the small island of Samarai in Papua by filling in and draining a swamp, the harmful miasmata being thus prevented from affecting the inhabitants. Again, amongst allied troops in New Guinea during the second World War, malaria was effectively controlled as soon as the suppressive use of "Atebrin" was made a matter of strict army discipline, which is impossible to imitate amongst a civilian population.

FIGURE I.
Members of an oiling squad in a mangrove swamp at Sorong, Netherlands New Guinea.

In post-war years malaria control has been carried out more or less effectively in centres of European population, mainly by means of larval control measures together with supplementary use of such suppressive drugs as "Paludrine" and chloroquine. For a number of reasons it has not been practical to extend larval control measures to rural areas, and certainly the native people do not as a rule cooperate in the regular taking of suppressive drugs, even under supervision; this I have found in the Trobriand Islands, where I conducted an experiment in drug suppression of malaria in 1952 and 1953.

In these malarious island groups of Melanesia there is a native population of about 3,000,000, and the great bulk of these people are in New Guinea. Probably about two-thirds of this number live in malarious regions, and of these approximately 2% are protected in some way against malaria. This contrasts markedly with the state of affairs in East Asian and Western Pacific countries, where 29% of 276,000,000 people living in malarious areas were protected against this disease in 1953, and this figure is much higher at the present time.

The main method of malaria control in most of this area is by antilarval measures. Apart from civil engineering works, oil is used as a larvicide, and in many areas DDT is added to the oil. At Sorong, in Netherlands New Guinea, oiling without DDT has been used since 1947 by

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de Rook, who has had many years of experience with malaria in New Guinea. He has been able, with the backing of an oil company in production, to obtain results which are comparable with the best Australian army wartime figures with "Atebrin". He has found that constant personal supervision was necessary to secure this result. This is not possible when oiling is used over a larger area or in many areas, as oiling squads fail to carry out the work entrusted to them. Thus larval control methods are not applicable to the control of rural malaria in the South-West Pacific area.

FIGURE II.
Method of control of roadside breeding places at Sorong.

The addition of DDT to oil used for larvicidal purposes has recently been condemned at malaria conferences arranged by the World Health Organization, as this procedure favours the development of resistance to DDT in anopheline mosquitoes. If larvicides are to be used, it is recommended that oil alone or Paris green should be employed. This recommendation should be noted in those areas of the South-West Pacific where DDT is added to the oil used on breeding sites.

In the New Hebrides residual spraying of native houses with DDT has been used for some years and in a restricted area, mainly on Efate Island. This was a continuation of the early work on DDT done in the war years in this group. The method appears to be effective, although there has been little or no scientific control of the work. A similar situation has occurred in the Mekeo district in Papua, where DDT has been sprayed enthusiastically on the walls of native houses; but no observations have been made which could give an accurate assessment of the results of this method of malaria control.

It is pertinent here to examine the cause for the delay in adopting residual insecticide spraying as the method of malaria control in the South-West Pacific area, a method which has been used with success in many of the malarious countries of the world. Spraying of the walls of houses with DDT, which acts as a residual insecticide, relies for its effect upon the habits of the adult mosquito. If the mosquito rests upon the sprayed wall for sufficient time during its sojourn in the house, then it acquires a lethal dose of DDT. If it does not alight on the wall, or if it is repelled from the house by the DDT, then this method cannot be effective.

The main vectors of malaria in the South-West Pacific area belong to the punctulatus group, namely: *Anopheles punctulatus, A. farauti, A. koliensis.* In pre-war years both Heydon and de Rook had reported members of this group resting indoors in the daytime. However, it was the general experience of wartime Australian Army entomologists that *A. farauti* and *A. punctulatus* were not found resting indoors, and, in their experience, outdoor resting was preferred by these species. However, there were exceptions to this, and occasionally large catches were made indoors in the daytime. The American workers in the Solomons and New Hebrides found that the anopheline vectors, mainly *A. farauti*, could be taken at will in native houses in the daytime.

Thus there emerged in regard to New Guinea the opinion that members of the punctulatus group entered houses at night, fed, and flew away. They did not remain in the houses. There were, however, numerous reports from Australian Army entomologists of indoor resting at night. Despite this it has, until recently, been considered that residual spraying would be an unsuitable method for malaria control in New Guinea.

However, work done in the last few years has considerably changed this opinion. I myself have made numerous observations of *A. farauti* resting indoors in the daytime in widely separated areas in Papua-New Guinea, on small islands, on the coast of the mainland and on the coastal plains, and again in the highlands at a height of over 5000 feet. I have also taken *A. farauti* and *A. punctulatus* resting indoors in the daytime on the coast of Netherlands New Guinea and inland in that territory; and *A. farauti* in similar circumstances in the New Hebrides. In the British Solomon Islands I have also seen *A. farauti* resting indoors.

Metselaar and van Thield have also observed this daytime resting in Netherlands New Guinea. They have made observations on the behaviour of the punctulatus group in relation to experimental houses at Hollandia, and I was fortunate to be present when some of this work was being done. Three experimental houses were built from native materials and were made as mosquito-proof as possible. The eave-flaps were constructed so that they could be opened or closed as required. There were two exit holes for each house, and these led into removable traps.

Numerous observations were made in these houses before they were treated with insecticide, and the results were extremely interesting. The number of anophelines that entered the huts in the period from dusk to midnight was the same as in the period from midnight to dawn. About

FIGURE III.
Experimental houses for observation on anopheline behaviour at Hollandia, Netherlands New Guinea. (Official Netherlands New Guinea photograph.)

one-sixth of the anophelines that entered the house at night remained inside resting on the walls in the morning —the remainder were caught in the exit traps. The great majority of anophelines leaving the house had fed. Finally, dawn appeared to be a stimulus for leaving the house on the part of the anophelines. The species observed were *A. punctulatus, A. farauti, A. koliensis, A. kawari* and a few *A. longirostris.*

One house was then sprayed with DDT to give a deposit of two grammes per square metre on the walls; the second was sprayed with "Dieldrin" at 500 milligrammes per square metre; and the third was left unsprayed for comparison. Observations were then continued. In the houses which had been sprayed with DDT and "Dieldrin" many

dead anophelines were found on the floor in the morning, and none were found in the unsprayed house. Dead anophelines were found in the exit traps of both sprayed houses, and none were found in those of the unsprayed house. In the exit traps from the house sprayed with DDT some anophelines were alive in the morning; but the

FIGURE IV.
Adjustable eave-flap in an experimental house, Hollandia. (Official Netherlands New Guinea photograph.)

majority of these died within twenty-four hours, and only one survived for thirty-six hours. In contrast to this, the majority of the live mosquitoes in the traps from the unsprayed house lived for forty-eight hours or more. No live mosquitoes were found in the exit traps of the house sprayed with "Dieldrin"—they were all dead. No repellent effect due to spraying with DDT or "Dieldrin" was observed.

FIGURE V.
Exit traps in an experimental house, Hollandia. (Official Netherlands New Guinea photograph.)

These results were very encouraging, and a pilot project, with the use of DDT wettable powder as a residual spray for native houses, was commenced in the Lake Sentani area near Hollandia. The project covered a group of about 6000 people and was commenced early in 1954. Preliminary basal observations were made, and then all the houses in the area were sprayed. After this, frequent regular observations were made upon the children, the infants aged under one month receiving special attention, as this group gives evidence of interruption of malaria transmission. The latest reports from Netherlands New Guinea indicate practically complete cessation of the transmission of malaria in the sprayed area. Work is now in progress to extend the spraying programme to the Biak area, which has a population of 70,000.

In Netherlands New Guinea the Administration has set up a Malaria Control Service with trained staff, which is adequate for the work in hand, and which will be increased as the malaria control programme is extended. The Director of this service has the full support of the Administration, and funds are readily available for its activities. It is considered that malaria is an urgent and vital problem, and that its control is a necessary step in the development of this territory.

This work has given the lead to the malarious countries of Melanesia, both in the technical work which has been done and in the administrative organization of the Malaria Control Service.

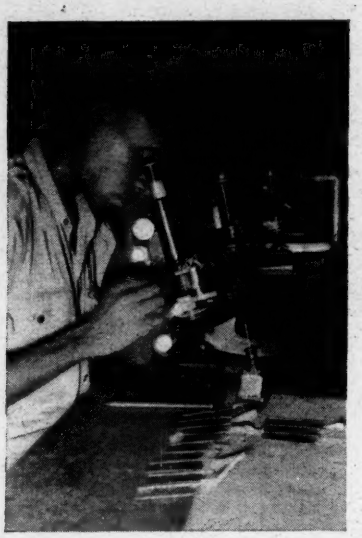

FIGURE VI.
Students of the course for malaria "mantri" at Hollandia. (Official Netherlands New Guinea photograph.)

Conclusion.

To sum up, then, we may say that suppressive drugs used under strict discipline have proved an effective but temporary means of malaria control in special population groups in the South-West Pacific area. Larval control measures can be effective in special localities if they are rigorously pursued; but they have no place in a nation-wide malaria control project in this area. The only possibility remaining for the effective control of rural malaria in the South-West Pacific area is the spraying of houses with a residual insecticide such as DDT or "Dieldrin", and early work along these lines has already given encouraging results.

The attack on malaria in these countries is thus at the commencement of a period in which great advances can be made towards the goal of eradication. That this goal is an attainable one has been shown in Mauritius, and it is being approached in Ceylon. But a note of warning has been sounded in Greece and Indonesia, where resistance to DDT has been developed by some of the anophelines.

Thus a national malaria campaign must be planned so that it is carried out efficiently and as rapidly as possible so that transmission is halted for a sufficient period throughout the country to allow interruption of spraying before resistance has developed in the anopheline vectors. Spraying does not have to be continued year after year for an indefinite time; once its full effect has been achieved it is stopped, and the area is policed by vigilance groups who detect any recrudescences of the disease at an early stage and immediately implement the appropriate measures.

I have stated elsewhere, and now repeat, that nothing effective will be done about malaria in a country until the government of that country has been thoroughly convinced that rural malaria control is an essential part of the developmental programme. As Paul Russell has said: "No country in which malaria is a serious problem can afford *not* to control its malaria."

The investment of funds in an effective malaria control programme is not an inexpensive one; but the dividends are rich and are spread over the spheres of health, and of social and economic benefits.

To supervise the work there must be adequate skilled personnel. Adequate and assured funds must be available from a government convinced of the importance of the work. A national malaria programme has many spheres of activity which must be effectively organized. Training facilities must be organized, supplies must be available where and when they are needed. Transport must be organized and labour trained and supervised. Changes in the laws of the country may be necessary to allow the campaign to be carried out. Research problems will arise and require investigation. All must be directed towards the rapid and efficient completion of the campaign, with effective surveillance when spraying has been discontinued.

In Netherlands New Guinea and in the Territory of Papua and New Guinea full-sized campaigns are possible, as each territory has a population of about 1,500,000. In the British Solomon Islands the population is only 100,000, and in the New Hebrides about 50,000. In these two countries malaria control programmes would be comparatively expensive. In all the countries of the area there are difficulties in transport and communication, which may increase the per-capita cost of the campaign but do not make it impossible.

The programme for Papua-New Guinea at the present moment is briefly as follows. An experienced malariologist will head the organization; there will also be an entomologist and an administrative officer. Twelve malaria control assistants at health inspector level will be in charge of spraying programmes in the various districts. A malaria school at Minj in the Western Highlands has been in operation since early last year. It is likely that "Dieldrin" will be the residual insecticide used, and work will commence as soon as appointments have been made.

It is to be hoped that in the next few years there will be considerable progress towards the goal of malaria eradication in those territories where, up till very recently, it has been considered impossible to combat rural malaria.

RESPIRATORY COMPLICATIONS OF ASCARIS INFESTATION IN FIJI.

By GEORGE R. HEMMING,
Suva, Fiji Islands.

DURING twelve years' medical practice in Suva, Fiji Islands, I have often been struck by the high incidence of apparent asthma amongst Indian children. Only recently, since most of my time has been spent amongst the poorer members of the community, has it become clear that practically all these cases of what looked like asthma were associated with heavy infestation with *Ascaris lumbricoides*.

One hundred cases of ascaris pneumonitis were recorded in forty days. This must be regarded as a high incidence of any one condition occurring in a general out-patient practice in the hands of one doctor. All the patients were Indians except two, who were Fijians. This race incidence is puzzling, as the numbers of Fijians and Indians who come to the J. P. Bayly Clinic for medical advice are approximately equal. It will be shown later that ascaris infestation is more common amongst Indians than Fijians.

Description of a Typical Case.

An Indian child, aged eight years, was brought in in a very distressed condition with dyspnœa, cyanosis and fever, having been acutely ill for twelve hours. The temperature was 102·4° F. in the axilla, and the pulse rate was 160 per minute. Rales and rhonchi were audible in all areas. Cough was severe, and the child was able to produce copious sputum for examination. The differential white cell count was as follows: the white cells numbered 20,000 per cubic millimetre, 72% being neutrophile cells, 26% lymphocytes, 1% eosinophile cells, and 1% monocytes. Cytological examination of the sputum showed that the predominant cells were eosinophile; epithelial cells and rather scanty neutrophile cells and lymphocytes were present.

This was the second attack the child had suffered, and the mother said that the child frequently passed long worms. No ascaris larvæ were found in the sputum.

Procedure Adopted in Such Cases.

In such cases the following procedure was adopted. (i) The mother was asked whether the child had recently passed long worms. (Seventy-one mothers answered in the affirmative.) (ii) If the answer to the first question was in the negative, the mother was asked to submit a stool from the child to the laboratory for examination. Examination of eight of these stools revealed ascaris ova. In 18 cases the mother failed to submit a stool as requested, but in two of these cases other members of the household were passing worms. (iii) If the stool examination gave negative results, the child was given peperizine. One child passed ascaris with this treatment in spite of a negative stool finding.

In two cases there was no history of worms and the stool examination gave negative findings.

Thus out of 100 cases, ascaris infestation was present in 80, two were associated with ascaris infestation in the household, in 18 cases no conclusion could be drawn as the parents failed to cooperate, and in two cases no ascaris infestation was demonstrated.

On theoretical grounds the absence of adult worms in any case would not, of course, be significant as the pneumonitis is caused by the larval stage in the lungs. Infestation must at times occur at a very early age, since one child of five months (not included in the present series) passed a full-grown worm.

Race Incidence.

It has been stated already that only two Fijian patients were recorded amongst the 100 cases; the others were all Indians. Table I shows the relative incidence of ascaris and hookworm infestation amongst school children. Only children who looked anæmic were tested in this series. The school children tested numbered 913.

TABLE I

Worm Infestation.	Indians.	Fijians.	Others.	Total.
Ascaris infestation	63	27	3	93
Hookworm infestation ..	111	120	0	231
No worm infestation found ..	256	261	72	589
Total	430	408	75	913

There would appear to be a significant difference between the infestation rate of ascaris in the two races, but the number may not be large enough to be significant, and it concerns selected school children and not an overall rate.

Age Incidence.

The age incidence is shown in Table II.

Family Incidence.

As would be expected, there was a tendency for several cases to occur in a household. Nine homes accounted for

27 of the cases. In one household six children were having recurrent attacks of fever with cough and "asthma". All were passing long worms from time to time. This family lived under poor conditions. The husband was unable to work and was drawing £3 a month relief.

Deaths.

There was only one death in this series of 100 cases. However, looking back over similar cases in the past five years, one realizes that there is a definite mortality rate amongst severe cases. The death that occurred was that of an Indian female child, aged one year and five months, from a country settlement about 30 miles from Suva. This child had been ill for three days before being brought to the clinic. She was in a very poor condition when brought for treatment, with severe bronchospasm and an uncountable pulse, and she died four hours after treatment was commenced. Unfortunately, there was no post-mortem examination.

TABLE II.

Age (Years).	Number of Cases.
0 to 2	19
2 to 4	26
4 to 6	27
6 to 8	15
8 to 10	5
10 and over	8

Standard of Living.

All patients except two came from poor surroundings, where the income of the breadwinner would be less than £4 a week. The J. P. Bayly Clinic has been established to help people of the lower wage groups and to deal with their social and medical problems. Two of the patients did not qualify as clinic patients and came from good homes with good living standards. Of the remainder, 21 patients lived in Suva and 77 came from country areas lacking sewerage. The majority would rely on pit privies.

Treatment.

The treatment given was symptomatic. All the patients had a high temperature and were given full doses of penicillin with or without sulphonamide drugs. In some cases adrenaline was given to relieve the acute spasm, and an expectorant mixture containing "Benadryl" was exhibited. Ephedrine was also prescribed to be given at home. More recently we have relied upon penicillin and treatment of the ascaris infestation without the other measures.

Peperizine hydrate (until the stocks in the local pharmacies ran out) or santonin in full dosage was prescribed to be used after the children had recovered from the acute symptoms.

Conclusions.

1. "Ascaris pneumonitis" is a very common condition in Suva amongst Indian people, especially those in the lower wage groups.

2. The condition presents a clinical picture of bronchopneumonia with severe bronchospasm as the outstanding physical sign.

3. Research is needed here to determine the method of infection with ascaris larvæ.

4. In places of high incidence of ascaris infestation cases of apparent asthma should be carefully investigated to exclude the possibility of ascaris pneumonitis.

Reports of Cases.

THE TRIPLE SYNDROME OF BEHCET.

By ROBERT G. LINTON AND ERIC G. SAINT,
From the Clinical Research Unit, Royal Perth Hospital, Perth.

IN 1937 the curious association of recurring iritis and stomal and genital ulcers in a Turkish patient was described by Behcet of Istanbul. His name has subsequently been used as an eponym in the description of this uncommon triple symptom complex, although Blüthe (1908) and Adamantiades (1931) had previously described similar cases. Approximately 40 additional cases have since been reported in the literature (for bibliography see France *et alii*, 1951). To the original triad of symptoms other manifestations have been added—notably arthropathy, skin lesions and thrombophlebitis. The ætiology of the disease remains obscure. Behcet himself (1939) postulated infection with a virus, but most attempts to identify an ultrafiltrable agent have failed. More recently there has been an inclination to place Behcet's syndrome alongside the mucocutaneous syndromes of Reiter and Stevens-Johnson, and to attribute the ætiology of all three to "hypersensitivity".

In the following case, a typical example of Behcet's syndrome, problems of ætiology and management were posed.

Clinical Record.

A woman, aged thirty-five years, was first admitted to the Royal Perth Hospital in February, 1954, with the complaint of sudden deterioration of vision in the right eye. Her father had died of myocardial infarction; her mother is alive and well. Two of five siblings are subject to attacks of hay fever. The patient has three healthy children, aged respectively nine, seven and three years. She is said to have developed œdema in the later stages of each pregnancy.

The clinical features which may be permissibly included in Behcet's syndrome can be said to date from 1944, the year after she was married, when she had a brief attack of what was described as "pyelitis"—rigors, frequency of micturition and scalding. Similar attacks lasting only a few days occurred during each pregnancy.

In 1947 she began to have recurring ulcers in the mouth. They began as small red nodules, breaking down in twenty-four to thirty-six hours to form shallow, painful ulcers, situated on the buccal surface of the cheek and the moist surface of the lips near the muco-cutaneous junction. Occasionally up to five ulcers in various stages of development have been present at one time, and usually at least one has been present.

In 1949 vulval and vaginal ulcers first made their appearance. These are shallow, undermined ulcers which appear on the moist epithelium of the introitus, causing local discomfort and irritation, dyspareunia, and an offensive vaginal discharge. New ulcers appear less frequently in the mouth; she has had periods of freedom of as long as eight months (during her last pregnancy).

A month after the appearance of the first genital ulcer in 1949 she developed acute generalized arthropathy, diagnosed as rheumatoid arthritis. She was completely disabled, with pain and limitation of movement in all the central and peripheral joints. The interphalangeal, metacarpo-phalangeal, wrist, elbow, knee and ankle joints were visibly swollen and tender. Even the temporo-mandibular joint was affected. For six months she was confined to bed and given weekly gold injections. The joint swelling gradually subsided, and the range of joint movement returned to normal. After nine months she was completely free of pain, and no residual joint deformities were present.

After her last confinement in 1951 she began to have attacks of fever at intervals of approximately two months.

For two or three days she would feel alternately hot and cold; her temperature would rise to 102° or 103° F. The duration of fever was unaffected by treatment with antibiotics or sulphonamide compounds. In February, 1954, she had another febrile attack, and awoke one morning with blurred vision in the right eye. On examination in hospital she was no longer febrile. In the right eye ciliary injection was noted. The pupil was slightly irregular and contracted, and superior and inferior posterior synechiæ were present. The white cell count was 13,000 per cubic millimetre. The Wassermann test produced a slightly positive reaction.

With "Neo-Synephrine" and homatropine applied locally and cortisone given systemically (1000 milligrammes in six days), the synechiæ separated satisfactorily, and vision in the right eye returned to normal after three days. It was noted that after cortisone treatment the response to the Wassermann test had become negative.

She returned in May, 1954. She had been in reasonable health, apart from the ever-present mouth ulcers, until two days prior to this second hospital admission, when she felt feverish and was affected with frequency of micturition and scalding. The vision in the right eye had once more suddenly deteriorated.

On examination, the patient was seen to be a woman of average build. Her temperature was 101° F., her pulse rate 110 per minute. Two small ulcers were present on the inside of the cheek. They were shallow with hyperæmic edges, three millimetres in diameter. A shallow, undermined ulcer one centimetre in diameter was present in the introitus. The lymph nodes were not enlarged and the spleen was not felt. No swelling, deformity or limitation of movement of joints was noted. The heart, lungs and central nervous system were clinically normal. The right pupil was slightly irregular, the vitreous was hazy, and posterior synechiæ were present. The erythrocyte sedimentation rate was 104 millimetres in one hour (Westergren). *Staphylococcus aureus* and *Proteus mirabilis* were cultured from the vaginal ulcer and *Streptococcus hæmolyticus* and *Neisseria catarrhalis* from the mouth ulcer. No albumin, cells or casts were found in the urine. The albumin-globulin ratio was 3·7:4·2. By fractionation methods increase in α and γ globulins was noted. Biochemical tests of liver function gave normal results.

Scrapings from the mouth ulcer were forwarded to Dr. G. Anderson, of the Walter and Eliza Hall Institute, Melbourne, for virus studies; the results were negative.

Cortisone was given for thirteen days (100 milligrammes per day). The temperature fell to normal, the local eye signs improved and vision returned to normal within forty-eight hours. No new ulcers developed while the patient was receiving cortisone in high dosage.

She remained well until October, when widespread urticarial lesions lasting for five days appeared on the skin of the trunk and limbs. She complained a week later of very severe pain in the lumbo-sacral area, for the relief of which she required up to a dozen aspirin tablets per day. She felt wretched, feverish and nauseated, complained of great pain from the mouth ulcers, and had frequency of micturition.

On examination of the patient after her readmission to hospital, the loss of seven pounds in weight was noted. The right and left pupils were normal. Although she complained of constant pain, no deformity or tenderness of the lumbar part of the spine was observed, and movements were unimpaired. Her temperature was 102° F., her pulse rate 100 per minute. The erythrocyte sedimentation rate was 155 millimetres per hour (Westergren), the hæmoglobin value was 8·6 grammes *per centum*. The leucocytes numbered 10,800 per cubic millimetre. The urine contained a trace of albumin, many red blood cells, polymorphonuclear cells, and a few granular casts. The radiological appearances of the sacro-iliac, wrist and metacarpophalangeal joints, and of the lumbar part of the spine, were normal. Excretion pyelography revealed no abnormality.

Despite complete rest and the administration of 60 grains of aspirin daily, the fever and backache persisted. The erythrocyte sedimentation rate remained elevated. Fresh crops of mouth ulcers appeared, as many as six being present at one time. Once more cortisone was given, 100 milligrammes a day by mouth; this produced an immediate fall in temperature and almost complete relief from pain. The mouth ulcers healed and no fresh ulcers appeared. After ten days the dose of cortisone was reduced to 25 milligrammes daily, and on this oral maintenance dose the patient was discharged from hospital.

Pain in the right hip joint recurred in December, 1954, and the dose of cortisone was raised to 50 milligrammes per day. Later slight œdema developed, which disappeared after mersalyl injections and lowering of the maintenance dose of cortisone to 25 milligrammes per day. For three months her only complaint has been of recurrent oral ulceration. However, in April, 1955, a flare-up of the iritis with fresh vitreous opacities occurred, in association with severe lumbo-sacral pain. It has been necessary to raise once more the dose of cortisone to 50 to 75 milligrammes per day.

Discussion.

In addition to the recurrent stomal and vulvo-vaginal ulcers and the irido-cyclitis which fulfilled Behcet's diagnostic criteria, this patient had at various stages in the course of her seven-year illness recurrent fever and leucocytosis, urticaria, a severe but self-limiting arthropathy, and recurrent lesions in the genito-urinary tract causing frequency of micturition and microscopically evident hæmaturia. All these manifestations have been reported as having occurred with greater or less frequency in the 33 cases collected in the review of France *et alii* (1951). Thus a third of all patients have had joint involvement and two-thirds have had skin involvement (*erythema nodosum*, pyodermia or "skin sensitivity"). Thrombophlebitis has featured in about one-third of reported cases. More rarely the central nervous system has been involved; symptoms and signs have indicated the likelihood of the occurrence of focal vascular lesions (Knapp, 1941).

The disease ran a typical episodic course. It is for this reason that diagnosis may be long delayed, until the coexistence in time of oral and vaginal ulceration and eye lesions enforces a reinterpretation of past episodes of "pyrexia of unknown origin", "rheumatoid arthritis" or "pyelitis". It would not be surprising if the disease entity in its fully established form or as *formes frustes* was found to be more common than is indicated by the paucity of reports in the literature. A review of the obscure cases of aphthous stomatitis, iridocyclitis and vulvo-vaginal ulceration which go through out-patient departments might bring to light further examples of Behcet's syndrome. It is a curious fact that over half of the reported cases have been a mong inhabitants of the Mediterranean or Near Eastern areas; it is conceivable that the countrymen of Professor Behcet are more alive to this diagnostic possibility than are western oto-rhino-laryngologists, gynæcologists and ophthalmologists. In this regard it is interesting that recently (1955) Phillips and Scott have been able to report 10 cases from one centre (Birmingham). This case is incidentally only the second to be described in Australia; the first (O'Donnell, 1947) was also reported from Western Australia.

The lesions of Behcet's syndrome are for the most part confined to the skin, the epithelial surfaces of the mouth and genitalia, and the synovia of joints. Presumably the "pyelitis" in this patient may be attributed to lesions in the genito-urinary tract similar to those appearing in the mouth. Biopsies of ulcers, synovia and skin have shown endothelial swelling of vessels and perivascular infiltration with mononuclear cells in submucous tissue (Adamantiades and Lorando, 1949; France *et alii*, 1951). Both the pathology and the natural history of the disease would appear to indicate that a hypersensitive mechanism, in which there is a curious localization of antigen-antibody reactions in vessels near epithelial surfaces, is responsible rather than a specific infective agent. It is in this respect that

Behcet's syndrome has been likened to and classified with Reiter's syndrome and the Stevens-Johnson syndrome. In this case there was indeed slight evidence of immunological abnormality; the γ-globulin fraction in the serum was elevated, and during a relapse a false-positive Wassermann reaction was noted.

The administration of cortisone would seem to be the only form of treatment likely to modify the distressing march of events which occurs in most cases. Heavy metals and antibiotics have been singularly unsuccessful in the treatment of previously described cases. Patients suffer a great deal of pain—in the mouth, in the joints, from phlebitis—and permanent blindness is likely to attend recurrent episodes of iridocyclitis. Fever, joint pains and the ocular symptoms have been kept under control in this case with the use of continued small doses of steroids. However, it is doubtful whether the antiphlogistic action of cortisone can be expected to abort the course of a progressive disease any more than it does in rheumatoid arthritis.

Summary.

A case of Behcet's syndrome is described. A thirty-four-years-old woman has had, over seven years, recurrent stomal and vulvo-vaginal ulcers, severe arthropathy, recurrent pyrexia, urinary symptoms, urticaria, and three attacks of iridocyclitis.

The majority of symptoms and signs have been at least temporarily suppressed by prolonged treatment with cortisone.

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A CASE OF CHLORPROMAZINE JAUNDICE.

By J. D. MURPHY and F. OFNER,

Lidcombe State Hospital, New South Wales.

Clinical Record.

MR. A., aged forty-two years, was admitted to Lidcombe State Hospital on August 14, 1954. He had been treated for hypertension for some years, and within the twelve months prior to his admission had had two cerebral vascular attacks resulting in transient left hemiplegia and persistent dysphasia (the patient was left-handed). After these attacks there was a considerable degree of intellectual deterioration, ultimately necessitating the patient's admission to hospital for institutional care. Further details of the patient's condition on his admission to hospital are not considered relevant to this report.

The patient went steadily down hill. He became restless and agitated, and on July 27, 1955, the administration of chlorpromazine was commenced in the dosage of 50 milligrammes three times a day. The patient was already taking phenobarbital, 0·5 grain three times a day, and vitamin *B* group tablets, two tablets three times a day, and these were continued.

On August 29 the patient was found to be jaundiced and apathetic. The urine was bile-stained and the liver somewhat enlarged, but not very tender. The fæces appeared to contain pigment. All drugs were immediately suspended. The following laboratory investigations were performed.

A full blood count gave the following information. The hæmoglobin value was 14·0 grammes *per centum* and the erythrocytes numbered 4,700,000 per cubic millimetre; the leucocytes numbered 8000 per cubic millimetre, 86% being neutrophile cells, 6% lymphocytes, and 8% monocytes (there were no eosinophile and no basophile cells).

No urobilinogen was found in the urine.

On August 30, microscopic examination of the urine revealed a few granular casts and leucocytes.

On August 31, stereobilinogen was detected spectroscopically in the fæces.

On September 2 the blood urea content was 110 milligrammes per 100 millilitres, the serum bilirubin content was 16·2 milligrammes per 100 millilitres, and the serum protein content was 6·9 grammes *per centum* (albumin 3·9 grammes *per centum*, globulin 3·0 grammes *per centum*, albumin-globulin ratio 1·3:1·0); the thymol turbidity was 2·1 units, the zinc sulphate turbidity was 5·0 units, and the serum alkaline phosphatase was 44 King-Armstrong units.

The patient's jaundice increased, and generalized muscle wasting developed. He was afebrile throughout. Mental and physical deterioration continued, and finally he died on September 4.

Post-Mortem Findings.

Autopsy was performed on September 5.

The subject was a very small man whose viscera were mostly below the usual weight. All organs were heavily bile-stained.

There was concentric hypertrophy of the left ventricle, and examination of the brain showed small bilateral cerebral softenings. The liver weighed 1200 grammes and had a nutmeg appearance. The bile ducts were explored, and there was no evidence of extrahepatic obstruction. Gall-stones were not present. The spleen weighed 105 grammes.

Dr. V. J. McGovern, of the Royal Prince Alfred Hospital, reported upon the histological findings as follows:

> Liver: There is disappearance of some cells from the centres of lobules and others are degenerate. This, however, is not a very prominent feature. The main feature is small plugs of bile mainly intra-cellular in the centres of the lobules. The remainder of each lobule is normal. The architecture is normal, although some portal tracts are a little larger than average. The bile ducts in the portal tracts all appear collapsed, and in none can any bile stasis be seen. In general the appearance is similar to that seen in cholangiolitic hepatitis.
>
> Kidney: There is mild nephrosclerosis present.
>
> Spleen: Congested.
>
> Comment: The appearances are compatible with the diagnosis of chlorpromazine poisoning.

Comment.

Chlorpromazine is now a widely used drug, and several cases of complicating jaundice have been reported. This jaundice is of an obstructive type and is classified as cholangiolitic. The mechanism is obscure, but the obstruction is intrahepatic. Similar jaundice has been reported following the administration of arsphenamine, methyl testosterone, thiouracil, sulphonamides, and chloroform

anæsthesia. Liver function tests consistently show no abnormality, and estimations of serum alkaline phosphatase and blood cholesterol contents usually show increased levels. Transient eosinophilia has been reported, and this is a very prominent feature in the case described by Hartnett (1955), in which the level of eosinophile cells was as high as 58% of 14,800.

In our case eosinophile cells were absent at the single blood examination performed and were not prominent in the histological material.

Chlorpromazine jaundice usually appears within the first few weeks of treatment, and in some cases has persisted for several months in spite of immediate withdrawal of the drug.

Van Ommen and Brown (1955) point out the difficulty in deciding whether obstructive jaundice in a patient taking chlorpromazine requires surgical intervention or whether it is a toxic manifestation of the drug. They suggest that the presence of eosinophilia may be a guide; but this is frequently absent, and if present may be only transitory. In several cases surgical exploration has been carried out, but no evidence of extrahepatic biliary obstruction has been found.

Summary.

A case of jaundice associated with chlorpromazine has been reported, together with laboratory and autopsy findings. The jaundice is of an obstructive type.

Acknowledgements.

We are grateful to Dr. H. G. Wallace, the Director-General of Health, New South Wales, and to Dr. G. S. Procopis, Medical Superintendent, Lidcombe State Hospital, for permission to publish the details of this case. We are also indebted to Dr. V. J. McGovern, histopathologist of the Fairfax Institute of Pathology, Royal Prince Alfred Hospital, who kindly consented to examine and report on our specimens.

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Reviews.

Backache in Women. By E. Schleyer-Saunders, M.D., F.I.C.S., with a foreword by W. C. W. Nixon, M.D., F.R.C.S., F.R.C.O.G.; 1955. Bristol: John Wright and Sons, Limited. 8¾" x 5½", pp. 80, with six illustrations. Price: 7s. 6d.

THE author of this book states as his object the presentation of his own experiences, from a practical point of view, as a guide and help to the busy practitioner. In this aim he succeeds admirably.

At a time when the diagnosis of "disk lesion" (or one of its many variations, including the popular but misleading term "slipped disk") is all too prevalent, it is most helpful to have a short pocket-sized book, the study of which should restore our perspective in the treatment of this all-too-common complaint.

This book exhibits a nice sense of balance and gives a critical evaluation of the various kinds of backache. It reminds the reader of causes of backache in the discard. It deals with the diagnosis, differential diagnosis and treatment of gynæcological backache, orthopædic backache, intervertebral disk lesions, rheumatic backache, coccygodynia, backache associated with intestinal and urological conditions, and psychoneurotic backache. There is also a brief word on prophylaxis. And if one could wish that the subject of manipulation might have been dealt with in greater detail, one must remember that the author set out to write not a text-book, but something that would be useful to the doctor who is busy. This instructive book may be recommended to all such practitioners. It will stimulate renewed interest in a problem which is forever with us.

Infant Nutrition in the Subtropics and Tropics. By D. B. Jelliffe, M.D., M.R.C.P., D.C.H., D.T.M. and H.; 1955. Geneva: World Health Organization. 9¼" x 6¼", pp. 238, with 24 illustrations. Price: £1 5s.

DR. D. B. JELLIFFE reviews infant feeding in various subtropical and tropical countries, with a description of the accepted European methods to serve as a basis for comparison. Thereafter he discusses nutritional diseases among infants and offers suggestions for improving infant feeding where necessary. There is a special chapter on protein deficiency in the weaning period (under the generic term "kwashiorkor") which is of great importance—the author claims, with reason, that this is the present-day outstanding global nutritional problem. The book is well written and produced, and provides an excellent basis for work on improving infant feeding in any backward country.

Bone and Joint X-Ray Diagnosis. By Max Ritvo, M.D.; 1955. Philadelphia: Lea and Febiger. Sydney: Angus and Robertson, Limited. 10" x 7", pp. 752, with 398 illustrations. Price: £11.

THIS is a large volume with good illustrations in the "negative". The author points out the great value of X-ray examination in the study of bone and joint lesions; next to histopathological methods, it is the most important method of investigation. The various sections are well arranged. After a general consideration of the method of examination, the various hereditary, congenital and developmental disturbances are discussed; then fellow chapters on traumatic lesions, infections, glandular and metabolic changes, diseases of periarticular tissue and joints, bone tumours and diseases of the spinal canal. Perfect radiograms taken in several planes are essential and follow-up films must be called for in several cases such as suspected fractures of the carpal scaphoid, ribs and spine, which may not be demonstrated in the early stages. The author insists on the referring surgeon stating definitely what region is under suspicion, and asks for a short history of the case. Only in this way can the radiologist instruct the technician on the type of film required. The morphogenesis of the skeleton with the method of development of cartilage and membranous bone is dealt with. Interesting tables and diagrams on the maturation of bones in boys and girls are given, with the dates of appearance of epiphyses and centres of ossification. All the unusual bone conditions, such as *osteogenesis imperfecta*, osteopetrosis, achondroplasia, are lucidly set out and discussed from the pathological, ætiological and radiological viewpoints. The accompanying illustrations are excellent. The author shows a tendency to refer to these conditions by the name of the original reporters, which is not to be encouraged. In describing tuberous sclerosis, he stresses the importance of the skin lesions in the facial region. In mongolian idiocy he describes some typical abnormal appearances in the bones of the hands. The section on the anæmias accompanied by bone changes is most illuminative. Anomalies of the bones of the hands and feet are described; and useful descriptions are given of the supernumerary ossicles in these regions. Bone tumours, both inocent and malignant, are covered adequately. The whole work is worthy of close study and is instructive and informative, and it is probably the best work on the subject yet published. It should be of the greatest value to the surgeon and clinician, as well as to the radiologist.

The Year Book of Pathology and Clinical Pathology (1954-1955 Year Book Series). Edited by William B. Wartman, B.S., M.D.; 1955. Chicago: The Year Book Publishers, Incorporated. 7½" x 5", pp. 486, with 168 illustrations. Price: $6.00.

CLINICIANS, whether specialists or general practitioners, will find much that is stimulating and instructive in this Year Book. It scarcely needs commendation to pathologists. Its distinctive feature is the series of special articles contributed at the invitation of the editor, William B. Wartman. These are not just reviews of a subject but contain original material presented by specially qualified men. James W. Reagan writes on "Carcinoma in Situ", Samuel P. Hicks on "Experimentally Induced Developmental Abnormalities of the Central Nervous System", Israel Davidsohn on "Cerebral Jaundice (Kernicterus)", and William S. Hoffman on "Serum Sodium Concentration and its Therapeutic Significance to the Clinical Pathologist".

The abstracted material comes from a wide range of general and special journals, and is handled in the usual Year Book way. The two main divisions of the book deal respectively with pathology and clinical pathology. The division on pathology opens with a short, thoughtful introduction by the editor on "The Scope of Pathology". Then follows a section on general pathology with subsections on neoplasia, inflammation and repair, infectious diseases, collagen diseases, radiation effects and miscellaneous topics. The remaining material is grouped according to the main anatomical and physiological systems.

The division on clinical pathology has three main sections. The first section, on hæmatology, has subsections on the anæmias, on transfusions and blood groups, on coagulation defects and on general considerations. The second section, on clinical microbiology, deals with viruses, with bacteria and seroreactions, and with fungi and parasites. The last section is concerned with clinical chemistry and has subsections on electrolytes, on electrophoresis, chromatography and proteins, on ammonia metabolism, on enzymes and on miscellaneous topics. The editorial comment is sparing but provocative of thought.

Annual Review of Medicine. Edited by David A. Rytand, M.D.; Volume VI; 1955. Stanford: Annual Reviews, Incorporated. 9" × 6", pp. 474. Price: $7.00.

THIS volume does not aim at comprehensiveness, but it covers in critical fashion a great deal of significant medical literature. It is made up of reviews by acknowledged authorities in both general fields of medicine and particular subjects. Currently published work, carefully selected, is appraised and placed in perspective. The result is satisfactory and makes this particular annual volume most acceptable to those who value the scientific approach to clinical medicine. Some sections range over their subjects in a general way; such are those on nutrition and nutritional disease, on allergy and immunology, on diseases of the nervous system, on psychiatry, on diseases of the bones and joints, on ophthalmology, on pædiatrics and on endocrinology. Other sections are deliberately limited in scope; that on infectious diseases is concerned only with viruses, that on the gastro-intestinal tract with the liver, that on cardiovascular diseases with surgery, that on neoplastic diseases with cancer, that on the respiratory system with interpretation of tests of function, that on toxicology with the isolation, identification and determination of poisons, that on diseases of the urinary system with surgical aspects. Special subjects given separate treatment include the leucocytes and the leucopathies, contrast methods in diagnostic radiology, laboratory aids to diagnosis and therapy, and antihypertensive drugs. An introduction by A. L. Bloomfield gives a brief history of medical literature, considers the problem of keeping up with it and suggests the criteria for an ideal medical review. It may be fairly remarked that the contributors to the *Annual Review of Medicine* obviously recognize these criteria. It is of interest to note that, although this is an American publication, three major articles come from England and one comes from New Zealand.

Human Physiology. By F. R. Winton, M.D., D.Sc., and L. E. Bayliss, Ph.D.; Fourth Edition; 1955. London: J. and A. Churchill, Limited. 9½" × 6", pp. 628, with 236 illustrations. Price: 32s.

THE fourth edition of this well-known text-book has been extensively rewritten, although its length has been increased by only twenty pages. It thus remains one of the shorter text-books of physiology. Unlike other shorter texts, it includes a good deal of quite advanced clinical physiology. As our reviewer of the previous edition pointed out, the editors here tend to fall between two stools: in finding room for this material the basic aspects necessary for a proper understanding of the subject tend to be inadequately presented.

Individual sections are of first-class quality. New authors include such well-known names as Barcroft (on the circulatory system), Wilkie (on muscle) and Harris (on ductless glands). There is a new chapter on body fluids, but this important topic is not well dealt with. Discussion of the causes and specific physiological effects of changes in the concentrations of the various ions present in body fluids is not much in evidence; instead there is a rather diffuse discussion in terms of "water" and "salt". There is also a curious table on page 271, copied from the previous edition, which appears to show that a subject on an exclusively milk diet will become progressively dehydrated.

As a series of monographs, this book can, on the whole, be highly recommended to the medical student who has acquired a grasp of the physical and chemical basis of physiology, or to the post-graduate student for revision. As an integrated introduction to physiology it is less successful and certainly requires the adjunct of a good lecturer to orientate the student.

A bibliography of key original work is included for the first time. It may be questioned, however, whether this will serve its purpose of encouraging reading by the student, as it is placed at the back of the book and no reference to it could be discovered in the text.

Hewer's Textbook of Histology for Medical Students, edited by C. L. Foster, M.Sc., Ph.D.; Sixth Edition; 1954. London: William Heinemann (Medical Books), Limited. 9½" × 7", pp. 446, with 418 illustrations. Price: 25s.

THIS book, now in its sixth edition, has been greatly enlarged and improved since Hewer's first edition was published in 1937. The present edition has been revised and edited by C. L. Foster, M.Sc., Ph.D., reader in biology in the University of London and senior lecturer in histology, Saint Mary's Hospital Medical School, London. The text has been expanded and additional photomicrographs, both in colour and in black and white, have been inserted. This book is well and clearly written and is an excellent example of the modern approach to histology. Chapter XXXVI, on the central nervous system, is particularly well written and illustrated. The art of photomicrography has put new life into text-books of histology, which are now very different from those of twenty years ago. Hewer's text-book could be improved by the addition of more colour photographs. The illustrations of the cells of the blood, for instance, are very poorly done in ancient black and white. However, on the whole the quality of the illustrations, diagrams and type is uniformly good and the book can be cordially recommended to medical students.

Books Received.

[The mention of a book in this column does not imply that no review will appear in a subsequent issue.]

"Mental Health and Infant Development: Proceedings of the International Seminar held by the World Federation for Mental Health at Chichester, England", edited by Kenneth Soddy, M.D.; 1955. London: Routledge Kegan Paul, Limited. Volume I, papers and discussions, 8¼" × 5¼", pp. 327, price 25s. Volume II, case histories, 8¼" × 5¼", pp. 294, price 25s.

The subtitles explain the nature of the work.

"The Pocket Book of Diets", by G. Barry Carruthers, M.L., M.B., B.S.; 1955. London: Evans Brothers, Limited. 6¼" × 4". Price: 5s.

Deals with the principles of balanced diet and the normal body requirements. The author deals with the various physical conditions for which a special diet may be needed. Advice on such diets is included.

"The Pocket Prescriber and Guide to Prescription Writing", by Alistair G. Cruikshank, F.R.C.P.E.; Sixteenth Edition; 1955. Edinburgh and London: E. and S. Livingstone, Limited. 4" × 2¾", pp. 299. Price: 5s.

The first edition was published in 1882.

"Atlas of General Surgery", by Joseph R. Wilder, M.D.; 1955. St. Louis: The C. V. Mosby Company. 13¾" × 10¼", pp. 222, with 101 plates. Price: £7 8s. 6d.

Each plate contains up to eight or more illustrations illustrating techniques favoured by the author.

"Analgesia for Midwives", by Hilda Roberts, M.R.C.S., F.F.A.R.C.S., D.A., D.C.H.; 1955. Edinburgh and London: E. and S. Livingstone, Limited. 8¼" × 5¼", pp. 75, with many illustrations. Price: 10s. 6d.

Intended for midwives who, in Great Britain, accept a role different from that of their Australian counterparts.

"Diabetes", by G. F. Walker, M.D., D.C.H., M.R.C.P.; 1955. Modern Health Series. London: Gerald Duckworth and Company, Limited. 7¼" × 5", pp. 96. Price: 8s. 6d.

Written for the general public.

The Medical Journal of Australia

SATURDAY, MARCH 24, 1956.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given: surname of author, initials of author, year, full title of article, name of journal, volume, number of first page of the article. The abbreviations used for the titles of journals are those adopted by the Quarterly Cumulative Index Medicus. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

PRECISION TECHNIQUES IN MEDICINE.

KELVIN'S aphorism that a condition or action which cannot be expressed numerically is not to be considered as known, has no doubt been of service in the physical sciences in making experimenters seek precision in their measurements and in describing phenomena in terms of units of time, length and mass. But useful as it has been and will continue to be, the advice should not be taken too literally. Even in the realm of the purely physical, errors, often of great magnitude, will occur in computations when some of the operative factors are overlooked. Kelvin himself made a miscalculation which caused considerable upset in the minds of researchers who were not physicists when he proved to his own satisfaction that the earth, as we know it, was probably about 100 million years of age and could not be more than 400 million years of age. The geologists and biologists who postulated thousands of millions of years were, he declared, definitely in the wrong, and something like dismay entered the minds of Huxley and other evolutionists. We now know that Kelvin's calculation was wildly wrong because he did not bring into his equations sources of heat energy which were then unknown; further, his views regarding the origin of solar heat are now of historic value only. The evolutionist who declared that it takes a million years to make a new mammal has emerged from the contest triumphant.

In the realm of the æsthetic, Kelvin's rule simply cannot be applied, and nothing but frustration will follow any attempt to put it to use. It is true that in musical instruments there are purely physical considerations which demand mathematical expression. The student of music learns that to understand an octave in a piano with its equal temperament and equalized semitones, numerical expression of frequencies is necessary, and he is often discouraged by what appears to him to be an unexpectedly complex mathematical exposition. The dimensions of organ pipes and the spacing of apertures in a flute are fixed by physical theory unrelated to the emotions which music emanating from these instruments can evoke; but whilst physical science gives the instrument, it is the musician who puts the instrument to use, and any attempt to compare numerically one musical composition with another would be unqualified folly. In architecture certain proportions are pleasing, but the ultimate criterion is not to be found in the data given by measuring tape but in the reaction of the appreciative spectator. "There should be no argument in matters of taste", stated the Latin proverb, and this simply means that in the æsthetic field numerical and therefore comparative assessments of human emotion are impossible.

In the domain of biology, including medicine, we find a growing encroachment of physical and chemical methods superseding the use of ordinary human faculties of perception. Here it may be mentioned that whilst our mechanisms of sensation are from a qualitative standpoint often superior to the instrument, they have little or no equipment for the quantitative and no provision for permanent recording other than a memory which is liable to error. In electrocardiography and electroencephalography we find precision in registering data of which our sensory faculties take no notice. The measurement of systemic arterial blood pressure, the recording of temperatures by the thermometer, the enumeration of blood cells, the determination of the hæmoglobin content of the blood, the classification of bloods into specific groups and the correction of errors of refraction in the cornea are examples of accurate quantitative estimations which would please an exacting physicist. Repeated efforts have been made to produce tracings giving the abnormal "murmurs" of cardiac or respiratory origin in the thorax, but success has not yet been achieved. One day, we may safely predict, the difficulties will be satisfactorily overcome. We must take cognizance of the fact that the precise methods of physics and chemistry are being applied more and more to medical investigations. The American Paul E. Klopsteg has recently stated:

> Under a grant from the National Institutes of Health, the National Research Council is carrying on a study to determine in what manner the theory and application of measurement and control, with all their implications, may best serve research in the biological and medical sciences. The finding should have potential value to all research scientists.

In a treatise just published entitled "Physical Techniques in Biological Research" one of the three volumes is devoted to optical techniques, and the contents are photochemistry and luminescence, light scattering, absorption spectroscopy, ultra-violet absorption spectroscopy, the light microscope, phase and interference microscopy, bifringence and dichroism and electron miscroscopy. The general practitioner uses one of these, namely, the light microscope, though occasionally a simple absorption spectroscope is brought into operation, but the laboratory consultant is resorting more and more to the other techniques.

The present methods of giving a numerical "intelligence quotient" are not accepted everywhere as satisfactory. One of the latest of these is a "testing program" for students intending to enter a medical course.[1] The University of Texas Medical School is foremost in this inquiry. As stated in a preliminary report: "The student who cannot pass the required courses wastes money spent on his education, keeps some other student away, taxes the patience of his teachers and retards his own discovery of a more appropriate career." "The projective tests used are the Rorschach, the Szondi, the Most Unpleasant Concept, the Figure Drawings, and other graphic techniques, part of the Thematic Apperception test and the Sentence Completion test." It is to be feared that many of these names will be unfamiliar to the staffs of medical teaching schools. Even if such probes into a student's mentality could be accepted as satisfactory, there would remain the question whether the figures are to be regarded as final; in other words, does the prospective medical student in future years remain precisely in the same mental level as when the tests were carried out? Most teachers have experienced the opposite extremes of the bright junior who does not fulfil the promise of his youth and the "dark horse", often a late developer, who achieves distinction despite a poor showing in his earlier years.

It is hardly necessary to point out that when a sufficiently large number of human units is examined, then statistical methods can be applied to human actions which are generally assumed to be volitional and personal, and also to the consequences of exposure to external agents, friendly and otherwise: the study of the mathematical theory of epidemics has made much progress in recent years.

One of the latest instrumental helps to men of learning is an apparatus which will translate one basic language into another. The first scientific attempt in mechanical translation was the result of collaboration between Georgetown University's Institute of Languages and Linguistics, Washington, and the International Business Machines Corporation, New York. Here more than 60 sentences were mechanically translated from Russian into English. It will be at once apparent that only the severely factual can be carried over from one language to another, and that subtle shades of meaning are beyond such handling. Still it is a beginning, and the future may see great developments. It may well be doubted if man's emotional life, even with enormously improved methods of devising conditioned reflexes, will ever be capable of quantitative assessment.

Current Comment.

"METARAMINOL" IN THE MANAGEMENT OF SHOCK.

WHILE the giving of blood to patients who are shocked after large blood losses is a *sine qua non*, there are many instances of shock in which there has been no actual blood loss; even when there has been loss, circulatory failure follows the cycle: reduced venous return to the heart—reduced cardiac output—decreased coronary circulation—defective myocardial contractility (and, in elderly patients, possibly myocardial infarction)—further reduction in cardiac output—further reduction in venous return. It can be said, therefore, that the employment of an agent which not only constricts the small vessels, thereby increasing the venous return to the heart, but also increases the tone of the heart muscle, has an important place in the treatment of shock, no matter what its cause. M. H. Weil[1] has investigated the effect of "Metaraminol", a drug with these actions, on patients with shock due to medical conditions such as coronary thrombosis and myocardial infarction, septicæmia, reactions to drugs and blood transfusions, and surgery of the adrenal glands. "Metaraminol" is structurally related to epinephrine, norepinephrine and methoxamine. It can be given by mouth, or by the subcutaneous, intramuscular or intravenous route. It is non-toxic. It has a prolonged duration of action (up to one and a half hours after subcutaneous injection). It has in a few instances shown a vagotonic action leading to cardiac irregularity and bradycardia, but these can be immediately blocked by atropine, without the loss of any pressor effect.

Weil recommends, for profound shock, a preliminary intravenous injection of three to fifteen milligrammes of "Metaraminol"; this normally produces, after five to eight minutes, a considerable increase in the peripheral pressure, which lasts for some twenty-five minutes. During this time a continuous infusion containing 30 to 200 milligrammes of "Metaraminol" per litre may be set up; the drug can then be given at a rate indicated by the patients' response. Once the blood pressure is well maintained, and the required amount of "Metaraminol" falls to 20 milligrammes per hour or less, infusion can be discontinued and subcutaneous or intramuscular injections substituted. Dosage is evaluated from blood-pressure readings taken every fifteen minutes, and from the patient's degree of mental alertness, his colour and strength, a threatened fall in pressure can be anticipated, while an accelerated response to small doses will indicate a decreased need for medication. Weil evaluates "Metaraminol" as having less pressor effect than norepinephrine, but a more prolonged action and no local effects at all; he considers it better, both in pressor effect and in length of action, than methoxamine and phenylephrine ("Neo-Synephrine"). The absence of local necrosis, and the versatility of methods of administration, added to its prolonged effect, make this a useful drug indeed.

CANCER IN CANADA.

MANY prophecies have been made concerning the fields of medicine and of science which will inevitably be conquered as man's restless curiosity probes into the unknown. Some knowledge is created by the precise triumph of statistics. Some knowledge is born almost accidentally, but the most is wrought by hard toil to match the present known against possibility, later by comparisons of probability and finally by discovery of truth itself. The task of seeking the cause and the treatment of cancer has occupied medical research and thought for many years. A recent symposium[2] of papers by eminent Canadian surgeons and statisticians surveys the whole field of death from malignant changes, deals with the influence of recent thought and treatment on the mortality and morbidity of specific growths, and discusses the inherent and particular characteristics of malignancy. Following the review carried out by the Christie Hospital, Manchester,[3] a survey of public opinion on the subject of cancer was carried out throughout Canada. The Canadian inquiry was confined to cancer of the breast and of the *cervix uteri*. The aspects of public opinion investigated were curability, the value of treatment and the symptoms. A. J. Phillips explains the results obtained. Cancer, in the public mind, outweighed all other causes of death and was considered to be the

[1] "A Psychological Testing Program for Entering Students at the University of Texas School of Medicine, Galveston", *Texas Rep. Biol. & Med.*, 1955, 13: 405.

[1] *Am. J. Med. Sc.*, October, 1955.
[2] *Canad. M. A. J.*, October 15, 1955.
[3] *Lancet*, October 23, 1954.

most alarming. A third of the persons interviewed thought that cancer was incurable, and the rest tended to be pessimistic. The importance of early treatment was by no means universally appreciated. Most women gave grave significance to such signs as post-menopausal bleeding and a lump in the breast. Rather more than half the women thought that they should be informed if cancer was present, but confidence in the results of treatment was not great. There was no great difference in the knowledge about cancer in the different socio-economic groups, but in the province of Quebec there was notable ignorance as compared with the rest of the country. A. J. Phillips and M. Owchar have studied mortality trends in Canada from the various sites of cancer. The statistics apparently indicate that there has been a reduction in the mortality rate for cancer of the buccal cavity in the male and for the body of the uterus. Particularly interesting is a reduction in the mortality rate for cancer of the stomach in both sexes. Malignant growths of the intestine, the rectum and the female breast have an unchanged mortality rate. Cancer of the male respiratory system, of the male urinary organs, of the *cervix uteri* and of the male genital organs have a significantly increased mortality rate, while deaths from malignant blood changes in both sexes have increased considerably. A. Horava and S. C. Skoryna discuss their observations upon the pathogenesis of neoplasia. They believe that tumour and host form an inseparable biological unit and that the cancer cannot be regarded simply as a self-perpetuating autonomy. The malignant cell may remain indefinitely in the body without giving rise to a detectable tumour and is probably developmental in origin. Growth and progression and even some metastatic growths depend upon the play of intrinsic biological factors. The reversal of the abnormal physiological conditions may result in the control or even in the retrogression of the malignant growth. The rate of growth depends both upon the inherent growth momentum of the cell and upon the degree of responsiveness to extrinsic stimuli. The rate of growth may not be greater than that of normal tissue, but the malignant cell is characterized by its persistency. The state of autonomy, in which the tumour cell is independent of extrinsic influences, is a final stage in the malignant change, and it is at this stage that metastases are formed, survive and proliferate. It is evident that the malignant cell is only a final stage in the neoplastic cycle. Extrinsic and intrinsic factors take some time to produce frank malignancy because of the several subthreshold neoplastic stages of the developing malignant tissue. There are probably three main phases. In the induction phase neoplastic tissue change takes place. In the critical phase the survival of the malignant cell and the development of a tumour depend upon the particular physiological balance of the host and the force and character of external factors. In the final phase the neoplasm has become autonomous, and its development proceeds apace.

N. C. Delarue deals with fundamental concepts determining a philosophy of treatment in cancer of the breast. He believes that treatment should be assayed against the possible good effect which it may have upon the patient. If the condition is not curable, then treatment to produce palliation must be carried out only if it affords a reasonable chance of a comfortable and useful remission. In the palliation of malignant disease, treatment may be designed to assist the host in competing successfully for essential metabolites. Œstrogens probably play a part in the early neoplastic cycle; so that œstrogen withdrawal by castration, adrenalectomy or the administration of androgens is rational and effective. In the later state of autonomy the neoplasm is no longer influenced by the hormonal environment. Once this stage has been reached, even though the growth may appear to be local and small, treatment, however radical, can only be palliative. Differences obtained in the success of therapeutic measures are probably due, not to the effectiveness of the treatment, but to the stage of malignancy which the tumour cell has reached. The curable cancer is one which is biologically inactive.

N. E. McKinnon warns his readers that higher survival rates are frequently not maintained. The first stage of cancer of the breast is not necessarily a recent neoplastic change. Many of these cancers would fail to progress rapidly even if untreated. Microscopically there is nothing to differentiate the progressive from the non-progressive lesion. Treatment of Stage I carcinomata must continue as at present simply for the sake of that proportion of patients in whom the neoplasm is progressive, but in whom the autonomous stage has not been reached. There is as yet no means of knowing which are the non-progressive and which are the autonomous types, but in either of them treatment has no effect upon the general mortality rate. N. E. McKinnon finally states that the treatment of metastasizing breast cancers over many years has failed to have a material effect on the mortality rate for this disease. The same is probably true for malignant metastasizing cancers of the *cervix uteri* and for those cancers in inaccessible places in both sexes.

R. L. Noble discusses some aspects of cancer hormone relationships. He concludes that a malignant cell is one which has become habituated to an abnormal hormonal or chemical environment. The cause of the change may be that of successful survival by adaptation to conditions of metabolic deficiency. The cell, thus formed, not only survives more easily, but utilizes, in its changed metabolism, components of the surrounding media to the active detriment of the normal and already struggling cells. Increased adaptability eventually results in complete isolation from the influence of hormones, and the autonomous stage has been reached. Carcinogens or antimetabolites work by encouraging adaptations in an active tissue. The cancer cell here also is the result of successful adaptation to competitive conditions. Any condition which tends to depress normal cellular growth may result in the production of malignant changes. Factors which encourage rapid cellular proliferation will likewise tend towards malignant changes by inducing exhaustion of essential metabolites. Drugs destined for the destruction of malignant cells must also, to be effective, inhibit adaptation in the normal cells of the abnormal environment. Future therapy may well make use of the powers of adaptation of the malignant cell by controlling and leading it into a further stage of adaptation, when it may be lured into feeding upon new and lethal metabolites and thus bring about its own destruction.

As man survives, cancer destroys. There is no limit to the tireless probing of workers in the field of cancer research. Some dare to hope that the answer is just around the corner. As yet we do not understand the true nature of the cancer cell, and reversal of the malignant process may be impossible after all. Malignancy is a complex syndrome of abnormal, pointless, useless and uncontrollable growth. There are many problems, and there may be many specific solutions. Until we know why the malignant cell exists, we must regard the efforts of research as those of a worker steadily climbing a dark spiral staircase of perplexity. With difficulty he remembers how far he has climbed; he cannot tell how far there is to go. He climbs on in the darkness and hopes that one day, without warning perhaps, he will see the filtrating light ahead and soon afterwards will step out into the bright light of power which comes through knowledge.

TOOTHPICK INJURIES OF THE INTESTINAL TRACT.

TOOTHPICKS are nowadays used rarely for picking teeth but commonly for holding together various small items of food while they are being prepared or cooked, and as a kind of handle when such tit-bits are served at cocktail parties and the like. They may be wholly enclosed in such things as meat balls or club sandwiches, and, as Elmer G. St. John[1] puts it, the frequent and unfortunate combination of alcohol, an upper denture and a club sandwich (containing a toothpick) can be serious. The toothpick's potential traumatic qualities should not be under-estimated—nor should the related diagnostic problems. St. John points out that a toothpick is sharp at both ends, long, indigestible and (in the ordinary way)

[1] *New York State J. Med.*, November 1, 1955.

invisible radiologically. It is the problem of radiological diagnosis that particularly concerns him. He states that as little as one cubic centimetre of free air in the peritoneal cavity can be detected by proper technique, but it is highly improbable that even small amounts of air will leak through the minute perforation made by a toothpick. In many of the reported cases a toothpick has been found to protrude through the intestinal wall, further tending to seal it. St. John suggests that the roughness of the toothpick may make complete extrusion into the peritoneal cavity improbable; but even if it was completely extruded, the process would be slow, and inflammatory exudate with organization would tend to seal off any incipient perforation before a detectable amount of air had escaped into the peritoneal cavity. The radiologist must, therefore, depend on indirect signs of intestinal perforation, which are the signs of peritoneal irritation and inflammation. Often contiguous, localized dilatation of intestinal loops is seen. The peritoneal fat layer may be œdematous or absent. There may be "splinting" of the overlying musculature, so that the involved side is shorter than its fellow, while scoliosis may be present with its concavity to the side of the lesion. A large abscess may bulge into the peritoneal fat. The *valvulæ conniventes* of the small intestine or the haustral pattern of the large intestine may surround the point of perforation like the spokes of a wheel. If the perforation is near the diaphragm, movement of the involved side of the diaphragm may be inhibited. Free fæces may be discernible in the X-ray picture.

These are the radiologist's clues, but the situation is one of those in which the collaboration of clinician and radiologist is particularly important. Of course, all swallowed toothpicks do not cause perforation of the bowel; but when it does occur, the diagnosis will depend a good deal on awareness of the possibility.

SKIN TESTS FOR PENICILLIN ALLERGY.

IT is not unlikely that penicillin rates today as one of the most common causes of drug reaction, but nevertheless there is little agreement as to the relative value of various tests for sensitivity to penicillin. Some of the most commonly used tests are those depending on a delayed reaction, but the really dangerous effects of sensitization to penicillin are the immediate, anaphylactic effects, while a delay of forty-eight hours, when the result of a test is being awaited, might easily prove serious for the patient. L. Tuft, D. C. Gregory and Joan Gregory[1] have reviewed the literature, and have found that there is no uniformity in the type, amount or concentration of penicillin used in the recommended tests, and that controls are rarely employed. They have accordingly investigated various types of tests. They chose aqueous solutions of procaine penicillin G and dibenzyl penicillin G, and for controls a solution of the usual vehicles, carboxymethylcellulose, sodium citrate, methylparaben and propylparaben. They used intracutaneous, scratch and patch tests, with various strengths of solutions, on three groups of subjects: 134 who had not had penicillin previously, 463 who had had penicillin without suffering any reaction, and 32 who had had a reaction. Specific positive results occurred in nine (1·8%) of those who had previously had penicillin; of the 32 who had previously suffered reactions, only three (9·4%) showed reactions to the tests. The investigators accordingly reached the following conclusion. First they concluded that skin sensitivity to penicillin is evanescent, and tests may give a negative result only two or three months after episodes of anaphylaxis; a negative result, therefore, does not exclude penicillin allergy. Secondly, they concluded that the most satisfactory skin test for the detection of penicillin allergy is the intracutaneous injection of 0·02 cubic centimetre of an aqueous solution containing 10,000 units per cubic centimetre. But if extreme sensitiveness is suspected, a scratch test should first be performed. A control test with a solution of the vehicle should be performed simultaneously. Thirdly, they concluded that immediate reactions, read after ten minutes for intracutaneous tests and twenty minutes for scratch tests, may be relied on, but delayed reactions are unreliable and of little value. Finally, they concluded that patch tests are of value only for contact dermatitis due to local application, and not for anaphylactic sensitivity.

It is really very satisfactory to have this important matter placed on a firm basis supported by experiment. Most satisfactory of all is the evidence that even a few months after an anaphylactic reaction, the skin is likely to have lost its sensitivity—this knowledge may some time save a tragedy.

[1] *Am. J. M. Sc.*, October, 1955.

PAIN-PRODUCING SUBSTANCE (P.P.S.) IN HUMAN PLASMA.

FOUR investigators working in the Middlesex Hospital Medical School, J. B. Jepson, D. Armstrong, C. A. Keele and J. W. Stewart,[1] announce that when fresh human plasma comes into contact with glass a subtle change occurs which manifests itself by the production of pain when the plasma is painted on a blister surface; it also causes contraction in the isolated rat uterus. If the plasma is stored in polythene, no such activity develops. The formation of the uterus-stimulating and pain-producing substance (P.P.S.) reaches a maximum after about five minutes in glass, but a spontaneous diminution takes place, so that 90% of the activity is gone in thirty minutes. The suggestion is made that P.P.S. may be a peptide split off from a larger molecule through some process induced by glass, and further that it has some likeness to the bradykinin obtained from bovine plasma by certain snake venoms and by trypsin. When activated plasma is treated with adequate boiling ethyl alcohol, the P.P.S. goes into the protein-free alcohol and remains stable. Possibly the same research workers may later find out if any association exists between the formation of P.P.S. and some early stage in the coagulation of blood. It is an old observation that shed blood clots very slowly if placed in a glass vessel the interior of which has been coated with paraffin wax; whereas coagulation is rapid when there is contact with ordinary glass. Every shaving man knows that when a cut begins to sting, this is a sign that clotting is well under way. What the teleology of such pain production could be the future may decide.

A NEW APPLICATION OF HIBERNATION.

THE cause of pulmonary hyaline membrane has not been established, and the condition is, strictly speaking, only conclusively diagnosable at autopsy. However, when a premature baby, particularly after it has been delivered by Cæsarean section, has a good colour and breathes well for a few hours after birth, and then becomes cyanosed and develops exaggerated respiratory movements and inspiratory recession of the rib interspaces, and shows diminution of breath sounds on auscultation, with stippling of the lung areas and abnormal clarity of the bronchi on radiographic examination, the diagnosis of hyaline membrane is at least strongly indicated. B. M. Stokes[2] reports such a case; the infant concerned had a cyanotic attack four hours after delivery by Cæsarean section at thirty-five weeks; all the above signs were present, and the child's condition deteriorated, being unrelieved by oxygen; twenty-six hours after birth the child collapsed and appeared to be dead, with no visible respiratory movements; but the heart was still beating, and with administration of "Coramine" and artificial respiration breathing recommenced. This collapse and cessation of respiration occurred four times, despite maxi-

[1] *Biochem. J.*, January, 1956.

[2] *Irish J. M. Sc.*, October, 1955.

mum concentration of oxygen; the intervals between attacks were becoming successively shorter. It was argued that, since the child's oxygen needs could not be supplied, its oxygen demand had to be reduced, so "Phenergan" and "Largactil", 1·5 milligrammes of each per kilogram of body weight per twenty-four hours, divided into hourly doses, were given, and the child was placed, naked, in an oxygen-filled incubator at 90° F. After four hours the child lay completely still and flaccid, her colour was better, and her respirations were less rapid. Tube feeding was necessary. After four days her condition had so improved that the doses of "Phenergan" and "Largactil" were gradually reduced, and the ambient temperature was allowed to rise; on the seventh day hibernation was discontinued.

After surviving an attack of melæna on her eleventh day and of enteritis on her twenty-first day, the child made a good recovery; and at eight months her general condition and development were excellent, while X-ray examination of her chest revealed normal lungs. This case, in which the presumptive diagnosis of pulmonary hyaline membrane appears to have been correct, provides an example of how logical thinking leads to a logical conclusion; it also provides an example of a method of treatment which might be of value in similarly desperate circumstances elsewhere.

UNILATERAL KIDNEY DISEASE AND HYPERTENSION.

IT would not be unfair to suggest that many physicians, when they come across a patient with hypertension and albuminuria, often do not question, immediately, whether the albumin comes from one kidney or both. On the other hand, how many physicians, confronted with a patient suffering from disease of one kidney only, thereafter keep a constant and determined watch on that patient's blood pressure? Yet, that one diseased kidney can cause hypertension, usually in a highly malignant form, and that removal of such a diseased kidney while the other is still secondarily unaffected will cause the disappearance of the hypertension are proved facts. L. J. Adams[1] has reviewed seven patients suffering from unilateral kidney disease and malignant hypertension, and discusses the effect of removing the diseased kidney. Adams emphasizes the features of the clinical picture characteristic of this condition. There is a short history of hypertension, often coming as a surprise finding in young people (but not necessarily confined to young people); there is a rapidly progressive downhill course; severe headaches, and retinopathy of rapid development, are noticeable features; the diastolic blood pressure, early, rises to 120 millimetres of mercury or more. In the absence of a history of some toxic condition which could account for bilateral renal disease, it would be wise to make a differential examination of the kidneys, for the patients reviewed by Adams all had unilateral disease—three had pyelonephritis, one a tumour, one old calcified tuberculosis, one hydronephrosis, and one a hypoplastic kidney. In six, the other kidney was healthy, and removal of the diseased kidney led to complete reduction of the hypertension and a return to normal health, whereas in the seventh, removal of the diseased kidney was delayed for twelve months while general treatment was tried, with the result that the other kidney appeared to have become arteriosclerotic, and the usual fall to normal blood-pressure levels after unilateral nephrectomy did not take place; the outlook for this patient is poor. In one of the others, whose history of hypertension was rather long, removal of the diseased kidney was followed by remission of all symptoms for fourteen and a half years, after which time he died, with failure of the remaining kidney, which showed malignant nephrosclerosis. The ages of these patients ranged from twelve to fifty-nine years.

[1] *Canad. M. A. J.*, November 15, 1955.

At autopsies performed on patients who have had malignant hypertension it is often found that one kidney is diseased, from one of many possible causes, while the other is affected to a greater or less degree by benign nephrosclerosis. The main hypothesis is that the abnormal kidney causes hypertension, which in turn causes arteriosclerosis in the healthy kidney, and that removal of the abnormal kidney before the other one is irreparably damaged cures the hypertension. The secondary hypotheses are that the diseased kidney excretes an excess of some pressor substance, or that it fails to detoxify a normally circulating pressor substance, or else that it fails to produce some theoretical substance concerned with the maintenance of normal balance in the blood-stream. It has been suggested that the basic mechanism in these cases is different from that obtaining in those associated with primary hypertensive vascular disease or with chronic bilateral renal disorders such as those resulting from general toxic states. However, discussion of these ideas is quite unprofitable, since so much guesswork is involved. Still, the known facts do suggest that secretion of some pressor substance is the most reasonable explanation. Almost any lesion of one kidney can initiate the condition; the lesion may be primarily vascular or primarily parenchymal; the most common lesion found is pyelonephritis.

Adams stresses the importance of thorough renal studies in all cases of hypertension. This may be going a little too far—he earlier mentions that unilateral renal hypertension is relatively rare—and in most patients with malignant hypertension there is usually to be found in the past history some obvious cause for bilateral kidney damage. Nevertheless, whenever a carefully taken history fails to reveal any such suggestion, it is mandatory to carry out a differential investigation of both kidneys; excretion pyelography is the simplest and most convenient method of early investigation; then come retrograde pyelography, aortography, and air insufflation, in that order. Given that a unilateral lesion is found, Adams gives these rules: the opposite kidney should be normal—it is inadvisable to remove the poorer of two involved kidneys; the hypertension should be of less than two years' duration; and retinal damage should not be serious and permanent—it can be regarded as indicating how much damage is likely to have occurred already in the vessels of the healthy kidney. It cannot be denied that a very little extra trouble in the taking of a full history and in the making of a relatively simple extra investigation can be worth while in patients, especially young ones, with malignant hypertension—it being always remembered that early operation is the essential requirement for cure. Use of the new hypotensive agents may produce an apparent improvement, but is unlikely to effect a radical cure, and the time lost in trying to determine their effectiveness may well allow permanent damage to recur, with a fatal result in the long run.

A NEW MEDICAL RESEARCH CENTRE.

COMMERCIAL drug firms have played an important part in medical research. This is often to their own financial advantage, but that fact does not lessen the value of the research. Perhaps the outstanding example is the Wellcome Foundation, in which Henry Wellcome left his entire interests to be administered by trustees for the advancement of scientific research work. Now an American firm has announced plans along these lines of such magnitude as to warrant comment. Parke, Davis and Company, of Detroit, Michigan, are planning to build a new medical research centre costing approximately 10,000,000 dollars. This will supplement the company's present research facilities, including the original laboratory, which is stated to be the first in America to be erected by any commercial institution solely for scientific research. Planning and construction are expected to take about three years. Parke, Davis and Company also maintain a research laboratory at Hounslow, Middlesex, England. It is good to see this additional large sum going back into research.

Abstracts from Medical Literature.

BACTERIOLOGY AND IMMUNOLOGY.

Interference and Immunity in Pertussis Infection in Mice.

D. G. EVANS AND F. T. PERKINS (*Brit. J. Exper. Path.*, August, 1955) have continued their studies of pertussis infection in mice by observing the production of both interference and antibody immunity by pertussis vaccine in the animals. They have previously shown that intracerebral challenge with virulent *Hæmophilus pertussis* organisms, in animals also given a single intraperitoneal injection of vaccine, was not followed by mortality comparable with that in controls, and that this phenomenon was due to interference. In the present series of experiments, groups of mice were immunized and challenged at varying periods of time. Tests for protective antibody in mouse serum were made in groups of normal mice by the complement fixation test. It was found that after a single injection of vaccine the interference effect lasted for up to ten days and disappeared by the eighteenth day. Antibody immunity began to appear at the fifth or sixth day and persisted for the duration of the experiment, while antibody in the mouse serum reached its highest titre about the twentieth day after the injection of vaccine. On the fourteenth day there was some indication of a fall in protection, probably due to the fading of interference before the full antibody immunity had developed. The authors suggest that these phenomena should be considered in testing prophylactic vaccines for potency, and the degree of immunity produced should be tested in mice after thirty days and not after fourteen days, when the results are not likely to be stable.

Poliomyelitis Virus and Human Brain Cells.

M. J. HOGUE, R. MCALLISTER, A. E. GREENE AND L. L. CORIELL (*J. Exper. Med.*, July, 1955) studied the effect of poliomyelitis virus on human brain cells in tissue culture. The tissues were taken either from the brain of stillborn fœtuses or during operations on adult brains, and was cultured in roller tubes. The nutrient medium was a mixture of Gey's solution, extract of ten-day-old chick embryo, human placental serum and penicillin. The virus was type I strain Mahoney, and it was added to growing tissue cells in a microslide, incubated at 37° C., and observed frequently. When the tissue culture was fifty-nine days old, neurons could be seen with long neurites. After the addition of virus these began to contract and to be absorbed into the cell body, and in three days the cell was dead. Controls without virus were still growing normally. Similar observations were made in cultures from the brain of an infant and from fœtal tissues. If a loopful of poliomyelitis antiserum was added to the preparation before the virus, then the cells continued to mature normally. The age of the tissue culture was not a factor in the process, but the age of the donor of the growing cells did appear to have a part. The fœtal cells were more sensitive to virus than were adult cells. All the changes are illustrated in photomicrographs and are due to virus action since they are prevented either by adding antiserum or by preheating the virus inoculum.

Antigens in Tubercle Bacilli.

H. PLATT (*Brit. J. Exper. Path.*, October, 1954) reports a study of the antigens produced *in vitro* by *Mycobacterium tuberculosis*, with some observations on the frequency of anaphylactic sensitization during the course of experimental tuberculosis. He used the Dale reaction for the detection of sensitization in the isolated smooth muscle of sensitized guinea-pigs. He tested unheated culture filtrates, a polysaccharide and various protein fractions, some of which could be inactivated by heat. Unheated culture concentrate regularly provoked a response, but the polysaccharide or protein fractions did not always do so. If the antigens were applied to intestine from animals experimentally infected, the demonstration of sensitization occurred irregularly, and was not consistent in the later stages of the disease, whether the animals were inoculated with B.C.G., avirulent human bacilli or dead bacilli.

HYGIENE.

Industrial Aspects of Bronchial Cancer.

L. BRESLOW (*Dis. Chest*, October, 1955) has analysed data recorded during interviews with 518 patients suffering from bronchial cancer and a like number of "control" patients in hospitals in California. He found that the following occupation groups appeared with substantially greater frequency among the patients with cancer: welders and sheet-metal workers doing welding; electric bridge-crane operators in the metal industry; construction and maintenance painters; commercial cooks; workers extracting lead, zinc and copper ore; steamfitters; boilermakers; asbestos workers; marine engineers; firemen; oilers and wipers.

Urinary Porphyrins and Lead Absorption.

J. WYLLIE (*Arch. Indust. Hyg.*, October, 1955) refers to the need for a simple chemical test of incipient lead poisoning. He describes methods of testing urine for porphyrins. In the analysis of morning urine samples from apparently normal persons, it has been observed that urines with a strongly positive qualitative reaction for urobilinogen generally also have high uroporphyrin values. There is evidence that this feature occurs in persons living on a high-vegetable diet as well as in those with certain liver diseases. An attempt has been made to correlate stippled cell counts with quantitative coproporphyrin determinations in a group of employees who were exposed to small quantities of lead for the first time in the buffing and spray painting of damaged motor vehicle bodies. As the stippled cell counts increased to 1000 and 1500 per 1,000,000 erythrocytes, the coproporphyrin values tended to increase. With continuing mild exposure to lead, although the stippled cell counts may not have exceeded 1000 per 1,000,000 erythrocytes, the urinary coproporphyrin values did tend to increase. Employees exposed to small quantities of lead for several years have higher urinary coproporphyrin and uroporphyrin values than those found in normal persons. Employees liable to high occupational exposure to lead have high values for urinary coproporphyrin, as the stippled cell counts exceed 1000 or 1500 per 1,000,000 erythrocytes.

Epidemiological Principles Applicable to the Study and Prevention of Child Accidents.

R. MCFARLAND (*Am. J. Pub. Health*, October, 1955) discusses methods of dealing with the problem of child accidents. Accidental injury is the leading cause of death for persons from birth to twenty-four years of age in the United States of America. Severe injuries and permanent disabilities result from accidents more frequently than does death. The control of accidents falls within the province of preventive medicine and public health, because of the strictly medical aspects of accidental injuries and because of the important role played by human variables. Accidental injuries and deaths obey some of the same biological laws as do disease processes, and are amenable to epidemiological methods of study and prevention. In most instances there is a multiple causation, and attempts at control should involve consideration of the agent, the host, and the environment. In a study of the host, that is the child, it is evident that initially it is necessary to protect him against accidents, but as he grows older education in safety becomes essential. The author suggests that a group of children characterized by physical strength, emotional instability, impulsiveness and rudeness are prone to accidents. Studies indicate that fatigue, diet and blood sugar level are also contributing factors. Control of the "agent" requires a knowledge of the frequencies with which various agents produce injury and relation of this knowledge to circumstances of the host and environment. The combined efforts of parents, the physician, the educator, the architect and engineer, and the public administrator are required to prevent children's accidents.

The Ecology of Infectious Hepatitis.

A. GELPERIN AND W. HAMPTON (*Am. J. Pub. Health*, October, 1955) studied the effect of environmental conditions on the pattern of an epidemic of infectious hepatitis in the American State of Iowa. The incidence rate per 1000 rose from 2·85 during the first three months of the year to 10·23 in the second three months, remained at 10·46 during the third three months, and then fell to 5·08 during the last three months. It then remained at an endemic level for the following year. The maximum incidence occurred in the five to nine and ten to fourteen years age groups. The attack rate increased with a decrease in socio-economic status.

There was no concentration of cases in areas with poorly absorbent soils. A higher incidence rate was noted in homes with privies than in those with either septic tank sewage disposal systems or connexion to deep drainage systems. Crowding and large families also appeared to increase the incidence. In addition, the utilization of γ-globulin prophylaxis for family contacts reduced the number of subsequent cases from 77·8 per 1000 unprotected familial contacts to 10·8 per 1000 protected familial contacts during the first year of study. An evaluation of the subsequent twelve months' experience tended to confirm the observations noted above.

Demonstrations of Infectious Agents in Sewage.

S. M. KELLY, M. E. CLARK AND M. B. COLEMAN (*Am. J. Pub. Health*, November, 1955) used a technique devised by Moore to collect organisms from sewage. Sterile square swabs, made by folding gauze measuring 6 by 48 inches, were fastened to stout string and suspended in running sewage. After a period the swab was removed. The fluid expressed from the swab was then examined bacteriologically for the presence of viruses, tubercle bacilli and Salmonellæ, all of which were recovered. The results of these three investigations illustrate the suitability of the swab as a sampling device and, in combination with appropriate isolation techniques, demonstrate the practicability of isolating infectious agents which may occur intermittently in sewage. These procedures offer a practical approach to the frustrating problem of searching for Salmonella carriers among groups of food handlers. More accurate information about the presence of infectious agents in sewage should now be obtainable during periods when outbreaks or epidemics are non-existent, as well as when they are recognized. Sewage treatment, while complying with existing standards, may not control pathogenic agents to the extent that receiving streams can be ignored as potential sources of infection.

Booster Inoculations and Serological Status of Children Vaccinated with Poliomyelitis Vaccine.

G. C. BROWN (*Am. J. Pub. Health*, November, 1955) investigated the response to booster injections of poliomyelitis vaccine of children who had received the vaccine one year previously. A total of 119 individuals in three countries were investigated before and after the booster inoculation. Their serum antibody titres were determined by neutralization tests in tissue cultures, and were then compared with the titres of their sera before and after primary vaccination. Owing to differences in the antigenic potency of the original vaccines, the primary immunizations had resulted in a good response in children of one county and in a poor response in children of two other counties. A decline in antibody titre over the next year was observed, and the average loss appeared to be greater in those groups which had shown the better response. The booster inoculation resulted in a sharp increase in antibody titre for all groups, but was especially effective in those who had responded poorly after the primary vaccination. The pattern of antibody titres was observed in an additional group of younger children who were observed for the same period of time, but who were tested by a more sensitive technique. In these individuals a very satisfactory response to the primary vaccination was followed by a gradual decline and an excellent response to the booster inoculation. The data are of value in that they represent the serological status of children immunized under actual field conditions and emphasize the beneficial effects of the booster inoculation one year after primary vaccination.

Germicidal Ultra-violet Irradiation in Infectious Disease Laboratories.

O. T. MILLER, R. F. SCHMITT AND G. B. PHILLIPS (*Am. J. Pub. Health*, November, 1955) describe an ultra-violet air sterilizer suitable for small volumes of air at relatively low flow rates. It is capable of eliminating high concentrations of bacterial spores from air at a flow rate of one cubic foot per minute and high concentrations of vegetative cells at ten cubic feet per minute. The apparatus utilizes four G36T6 ultra-violet lamps enclosed in aluminium tubes. The advantages of the ultra-violet treatment of contaminated air both from aerated bacterial cultures and from small aerosol chambers are indicated, and maintenance procedures are given. It is suggested that the apparatus may be employed to sterilize small volumes of air containing infectious microorganisms.

GYNÆCOLOGY AND OBSTETRICS.

The Cure of Uterine Prolapse.

E. SOLOMONS (*Am. J. Obst. & Gynec.*, September, 1955) considers that removal of the uterus is indicated in the cure of genital prolapse when there is an associated pathological condition of the former. However, the Manchester operation, modified for patients of different ages and different degrees of prolapse, fulfils the requirements in nearly every type of case. According to the author a satisfactory repair operation should achieve cure of the prolapse, complete relief of symptoms, normal coital function and no increased difficulty in conception and parturition. He considers that the whole principle of the Manchester operation depends on the preservation of the uterus, so that its main supports can be shortened and stitched to the front of the cervix. Critics of this operation hold that the resulting scarring of the cervix interferes with conception and parturition, and that the vagina is converted into a rigid channel. The author considers that the preservation of the uterus in younger women is advantageous physically and psychologically. He suggests that certain substances are secreted by the uterus, for example, menstrual toxin, which are of value to the general well-being of the premenopausal woman. Details of 190 patients submitted to the Manchester operation for uterine prolapse are presented. Only 62 of these patients returned for subsequent examination. The average age of patients in the series was forty-seven years. Of the 33 women of the childbearing age, who had operation and whose progress was followed, 14 conceived. The abortion rate was relatively high among those who conceived after operation. Seventeen patients were not completely cured of their symptoms, the most common sequel being recurrent cystocele (10 patients). There was no interference with intercourse in 74% of the patients, and stress incontinence of urine was not a feature in any of the 62 patients examined after operation. The author concludes that the time has come to evaluate the advantages and disadvantages of hysterectomy at repair operations. The question of over-enthusiasm, and of a more radical approach to the treatment of prolapse than is really necessary or advisable, should be considered.

Late Results of Pelvic Surgery.

E. T. ELLISON AND W. D. THORNTON (*Am. J. Obst. & Gynec.*, September, 1955) discuss late results following hysterectomy and pelvic plastic procedures in a study of 236 patients submitted to hysterectomy and 100 patients who had undergone vaginal plastic operations. The hysterectomies were 70% total abdominal, 24% vaginal and 6% subtotal. In 34 of the total hysterectomy cases an associated vaginal repair operation was performed. The majority of vaginal repair operations consisted of anterior and posterior repairs with cauterization and with conization or amputation of the cervix. An added feature in the repair technique of the authors is an incision through the vaginal wall posterior to the cervix, with shortening of the utero-sacral ligaments. The chief indications for surgery in the series were pelvic pain and functional bleeding. Thirteen cases of endometriosis were found among 98 "tumours", and adenocarcinoma of the uterus was found incidentally in three patients. Persistent trigonitis and urethritis were prevalent after all types of gynæcological operations, but stress incontinence was infrequently found. The authors consider that cervical disorders caused many late post-operative symptoms, and that trauma, incident to conization or partial amputation, was often followed by disabling symptoms. Dyspareunia, vaginal stenosis and recurrent vaginal relaxation were found more frequently after vaginal hysterectomy and vaginal plastic procedures. The authors consider that their technique of hysterectomy with endopelvic support avoids these disadvantages. They state that evaluation of emotional disorders after pelvic surgery is difficult, but that more painful fixations remained after vaginal plastic operations than after other gynæcological surgery. The authors conclude that the study indicates certain significant principles. Removal of the entire uterus, with or without the adnexa, eliminates a site of much pain and relieves bleeding. Painful disorders often persist after conservative treatment of the cervix. Removal of the uterus allows the surgeon free access to the strong endopelvic fascia in the construction of good pelvic support.

British Medical Association News.

SCIENTIFIC.

A MEETING of the New South Wales Branch of the British Medical Association was held at the Royal Prince Alfred Hospital, Camperdown, on May 19, 1955. The meeting took the form of a series of clinical demonstrations by members of the medical and surgical staffs of the hospital. Part of this report appeared in the issues of March 3 and 17, 1956.

Bone Grafts.

DR. F. H. McC. CALLOW presented a group of patients to illustrate the use of bone grafts.

The first patient, a man, had in March, 1954, sustained a compound fracture of the lower third of the left tibia and fibula. By open reduction and plating of the tibia, the fragments were placed in excellent position. The leg was kept immobilized in a long leg plaster cast. No union occurred. In May, 1955, a sliding bone graft was applied to the left tibia, and cancellous bone from the tibia was packed around the fracture site. The bone graft was fixed with three screws. A long leg plaster cast was applied. The X-ray films were available for inspection at the meeting.

A man, aged thirty-four years, had been involved in a motor-cycle accident in September, 1954, and had sustained a compound fracture of the left tibia. The wound was closed, and a long leg plaster cast was applied. The skin wound was slow to heal, and in April, 1955, there were still no signs of bony union. A sliding bone graft from the tibia was then applied to the fracture site. Bone chips were taken from the opposite iliac crest and packed around the fracture. A long leg plaster cast was applied.

A man, aged thirty-nine years, had been admitted to hospital in March, 1954, with a transverse non-compound fracture of the middle third of the right femur, sustained in a tram accident on that day. At operation open reduction and plating of the femur were carried out. Bone chips from the iliac crest were packed around the bone ends. The patient's limb was kept in traction by means of either the Hamilton Russell or the Thomas splint from the time of the operation. However, on several occasions the patient cut the ropes and released the traction. There was no sign of union by January, 1955. At operation the fracture site was exposed by lateral incision. The plate was removed, the bone ends were cleaned, and "V"-shaped excision of the bone ends was performed. An inlay graft from the right tibia was screwed onto the right femur. Bone chips from the left iliac crest were placed around the bone ends, and a new plate was screwed into place. The patient was subsequently kept in a Thomas splint with skin traction.

Bilateral Recurrent Laryngeal Nerve Paralysis.

DR. G. C. HALLIDAY showed a woman, aged forty-three years, who had been admitted to the Royal Prince Alfred Hospital in November, 1954, with a history that, fifteen years previously, she had undergone total thyroidectomy at another hospital; after it she had been, at first, unable to speak. Subsequently she became able to whisper, but found that she was dyspnœic even on mild exertion—for example, on sweeping. She was also easily fatigued, and experienced attacks of palpitations. The symptoms gradually became worse until the time of her admission to hospital. She had undergone some intralaryngeal procedure of which the details were unknown three years after the thyroidectomy, and a bilateral King's operation two years later, but her symptoms were unchanged by the operations. When she was examined in November, 1954, her right vocal cord was fixed in the mid-line. The left cord was resting about one millimetre from the right and was capable of further abduction of one millimetre on full inspiration. She had moderate exophthalmos, but otherwise appeared to be normal. A diagnosis was made of bilateral recurrent laryngeal nerve palsy. A preliminary tracheotomy was performed, and a few weeks later, via a thyrotomy approach, the left vocal cord was fixed in abduction by a wire suture; submucous resection of the left arytenoid cartilage was performed at the same time. The post-operative course was uneventful. The tracheotomy tube was occluded for increasing periods; and when the patient tolerated that without distress, the tube was removed. The tube granulations in the region of the anterior commissure were removed under direct laryngoscopy in February, 1955. The final result was a laryngeal aperture of about four millimetres, accompanied by a voice which was approximately the same as that before the operation. The patient no longer had any respiratory distress.

Subglottic Tumour.

Dr. Halliday also showed a woman, aged fifty-four years, who had developed a husky voice and sore throat on the afternoon before admission to hospital. On awakening the next morning she found herself in a state of severe breathlessness, being unable to breathe in and out freely, and had accompanying respiratory stridor. She felt that she had an obstruction at the level of the thyroid cartilage. She had had one similar attack a year previously, but had recovered quickly, unattended. When the patient was admitted to hospital, she had a rapid shallow respiratory excursion with loud inspiratory stridor. Her breath sounds were faint but vesicular, and continuous expiratory and inspiratory râles were heard over both lung fields. On indirect laryngoscopic examination the pharynx was seen to be injected. The vocal cords were of normal appearance and colour with no functional disturbance. During inspiration a red tumour was seen between the vocal cords in the subglottic region. A tracheotomy was performed that afternoon. About two weeks later the larynx was exposed by a laryngofissure approach, and the tumour was found attached to the posterior wall of the subglottic region of the larynx. It appeared as a red cystic mass, three-quarters of an inch in diameter. The tumour was removed and reported by the pathologist to be a chondroma. Two weeks later the tracheotomy tube was removed, and the patient recovered normal speech and breathing uneventfully.

Multiple Neoplasms of the Ureter.

In a demonstration from the Department of Urology by DR. J. W. S. LAIDLEY, DR. WALKER SMITH and DR. L. D. WHEELER, a man was shown who had had a history of right renal pain of six weeks' duration and hæmaturia twelve weeks previously. He was tender in the right loin and had a palpable mass in the renal area. Retrograde pyelography showed a constant filling defect of the right ureter, and the ureteric catheter could not be passed beyond that defect. A tentative diagnosis was made of "? neoplasm, ? radiotranslucent calculus causing hydronephrosis". The hydronephrosis became infected, and the patient developed a high temperature with severe toxic effects. Excretion urography showed a normal left kidney; and since the infection did not travel, a right nephrectomy was performed. The kidney was grossly infected, and the ureter at the pelvic brim was found to have a neoplasm at the sight of the filling defect. That was not removed owing to the patient's poor condition. Ureterectomy was performed later with diathermy to the bladder surrounding the right ureteric orifice, and the intramural ureter was treated with diathermy from above. After operation the patient was given a course of radiotherapy because of the anaplastic nature of the tumour. The pathologist reported that examination of the kidney showed acute pyelonephritis. In the right ureter there was a small thickening at the upper end, which was a very anaplastic carcinoma; four centimetres below that was a papilloma undergoing transition to anaplastic carcinoma, and almost completely blocking the lumen; five centimetres below that was a papilloma. The comment was made that, although such tumours were rare, more of them were now being diagnosed with earlier investigation of hæmaturia.

Acute Hydronephrosis Simulating Torsion of an Ovarian Cyst.

The second patient from the Urology Department was a girl, aged twelve years, who, in April, 1955, had developed sudden acute pain in the right iliac fossa; it was sharp, persistent and accompanied by vomiting. A mass was felt, which increased in size quite rapidly to the size of a football while the pain increased in severity. The diagnosis of twisted right ovarian cyst was made, but at operation the patient was found to have a large retroperitoneal cystic mass extending from the pouch of Douglas to the region of the right kidney. The kidney seemed to be attached to the cystic mass, and the ureter seemed to come from the mass. There was no sign of the left kidney, although that finding was uncertain because of difficulty in searching as a result of the size of the mass. The abdomen was closed with a view to fuller urological investigation. The patient was then admitted to the Royal Prince Alfred Hospital. She was still complaining of pain in the abdomen, particularly in the right iliac fossa, and there was an obvious mass extending across the abdomen past the umbilicus. Excretion pyelography produced surprisingly good films, showing the right kidney elevated and rotated with the ureter stretched over the cystic mass, which occupied the right side of the abdomen. There was no sign of a left kidney. The blood urea content was 51 milligrammes per 100 millilitres. Electrolyte determinations and other investigations produced

normal findings. A tentative diagnosis was made of crossed renal ectopia with obstructive hydronephrosis causing obstruction to the right kidney; that was confirmed by retrograde pyelography. Cystoscopic examination showed that both ureteric orifices were normal; indigo carmine was excreted well from the right ureter, but none was excreted from the left ureter. The passage of the catheter up the left ureter produced 30 ounces of fluid. At operation through a right loin incision a hydronephrotic left kidney was dissected out and removed. The patient had a smooth convalescence, her blood urea content fell to 22 milligrammes per 100 millilitres, and she was discharged from hospital fourteen days after operation. The pathologist reported the presence of congenital hydronephrosis due to pelviureteric stenosis.

The comment was made that the condition was a very rare abnormality and showed the importance of the investigation of the case. Even at the second operation when the diagnosis had been made, it appeared that the right ureter came from the hydronephrosis, and that ureter could easily have been removed with fatal results. The ureter from the hydronephrotic kidney was posteriorly placed and hidden until a late stage in the removal.

Gangrene of the Scrotum and Perineum.

The last patient from the Urology Department was a man who had been admitted to hospital in January, 1955, complaining of painful swollen testicles and some pain on passing urine for five days. He had also some urethral discharge. The scrotum was found to be enlarged to about the size of a football, with a small area of ulceration on the right anterior surface. There was general reddening of the penis and of the suprapubic skin. No enlargement of inguinal glands was felt. The lesion progressed rapidly. The scrotum became gangrenous and was swollen. The patient became more confused and toxæmic, and the day after admission to hospital he had a severe hæmatemesis, which made transfusion necessary. He had a leucocytosis, the leucocytes numbering 58,000 per cubic millimetre; 80% were polymorphonuclear cells. A swabbing taken from the meatus and scrotum yielded no significant growth of organisms. The toxæmia and hæmatemesis, which was the result of acute gastric erosions, continued for five days; during that time the patient required ten pints of blood, and urine was leaking from the perineum. The scrotum was a shocking mess. On January 17 the slough involving half the scrotum was removed, and the testes were found to be comparatively unaffected. The slough involved the perirectal tissues, and only paper-thin mucosa separated the finger in the rectum from the gaping perineum. The condition cleaned up remarkably well, and on February 3 a defect remained in the floor of the bulbous urethra over one inch long. The patient was discharged from hospital on March 5 with the lesion almost completely healed; he was passing 95% of his urine normally. There was no appreciable stricture of the urethra, and sounds could be passed easily.

The comment was made that, to anyone who had seen the condition at its worst, recovery had been miraculous. It seemed as if skin grafting would have been needed. Several other cases of gangrene met with at the hospital had also responded to conservative measures, and large defects had healed without grafting. The antibiotics used in the present case were penicillin and streptomycin for seven days and chloramphenicol for eight days.

Rehabilitation of Paraplegic Subjects.

DR. R. A. MONEY and DR. G. K. VANDERFIELD showed two patients who were suffering from traumatic paraplegia and were undergoing rehabilitation.

A man, aged twenty-seven years, had sustained a severe compression fracture of the seventh and eighth thoracic vertebræ when he touched live wires carrying 11,000 volts, and was thrown a distance of fifteen feet onto concrete in June, 1953. That resulted in complete paraplegia and loss of sensation below the level of the costal margin. He also sustained third degree burns on the front of both wrists and cerebral contusions, so that, at first, he was noisy and unmanageable. In September, 1953, he took a series of fits, and an electroencephalogram was abnormal. The complications made the initial period of nursing difficult, and he developed a large sacral bed sore and partial fibrous ankylosis of his knees and hips. In April, 1954, X-ray examination showed no signs of calculus in his renal tract, but there was ectopic bone between the upper end of the left femur and the left side of the pelvis, as well as a lot of callus in and around the right hip joint proceeding to ossification. By June his general condition had improved, and the electroencephalogram was normal. The large bed sore over the sacral region had healed after pedicle skin grafting, and physiotherapy was restoring function to the hands and fingers. However, satisfactory flexion at his hip and knee joints could not be obtained, and strong flexor spasms of the muscles of his abdomen and lower limbs occurred whenever any stimulus was applied; thus the assumption of a sitting posture and a wheel-chair life could not be attained. He was then transferred to a convalescent home, where he remained with an indwelling catheter and intermittent attacks of cystitis. The spasms continued, and movements at the hip joints became less, so that in March, 1954, he was readmitted to hospital for further rehabilitation in the following form: (i) An injection of absolute alcohol (15 millilitres) was given into the subarachnoid space in the upper lumbar region; that abolished completely the spasms in his abdomen and lower limb muscles and allowed his bladder to hold up to 15 ounces of urine. (ii) Disarticulation was carried out at the right hip joint, and the lower limb was totally removed, except for the actual head of the femur. (iii) The ectopic bone around the upper end of the left femur was removed; that enabled sufficient movement to be obtained at the left hip joint for the patient to assume the erect posture. (iv) Occupational therapy was carried out to improve the movements of his fingers. It was next intended to fit him with a special trunk and lower limb brace so that he might be taught to become mobile with the aid of crutches.

A man, aged twenty-nine years, had sustained a fracture-dislocation of the spine at the first lumbar vertebra, which caused complete paraplegia and loss of sensation below that level, when he was injured by a falling beam of timber in a mine in September, 1951. He also received a severe compound fracture of both bones of the right leg, which had to be amputated below the knee. About six weeks later he was transferred to the Royal Prince Alfred Hospital with a severe urinary infection and bedsores. Although the dislocation was almost complete, an exploratory operation was undertaken to relieve pressure on the roots of the lumbar segments of the cord, which were located above the level of the twelfth thoracic and first lumbar vertebræ; but at operation it was found that both the cord and the nerves of the *cauda equina* had been severed, so that the prognosis was hopeless. The patient was kept recumbent in the prone position until his bedsores had healed in March, 1952. He was then transferred to a wheel-chair, as his back was strong enough to support him. Movements at the hip and knee joints were satisfactory. He was then sent to a country hospital for further rehabilitation, but about a year later he had to be readmitted to Royal Prince Alfred Hospital as numerous bedsores had reappeared after a fistula had developed in his scrotum from a urethral abscess. Fibrous ankylosis had developed at his hip and knee joints, and he could no longer sit comfortably in his wheel-chair. A suprapubic cystostomy had been performed. The bedsores were healed by pedicle skin grafting, and attempts were made to regain movements at the hip joints by osteotomies and plastic procedures. Those proved unsatisfactory; and when he was taken over again by the neurosurgical department in May, 1954, numerous bedsores had reappeared, and he was having frequent injections of pethidine for pains in his back and abdomen. They were relieved by epidural injection of "Metycaine"; and by the reassumption of the prone position the bedsores were healed. The fistula track through his scrotum was excised and the urethra repaired over an indwelling catheter. The suprapubic wound was allowed to close, and urine was drained via the urethra into a rubber urinal. As bony ankylosis had occurred in the region of the false hip joints, both lower limbs were then disarticulated. Since that time, the patient's mental attitude had improved tremendously, and he had been able to assume a satisfactory wheel-chair life and to take care of himself for the activities of daily living.

Intracranial Aneurysm.

Dr. Money and Dr. Vanderfield also showed two patients who had been suffering from intracranial aneurysm.

A man, aged fifty years, had suffered from migraine headaches for seventeen years. Two weeks before his admission to hospital he had begun to have severe occipital headaches, and over the last three days before his admission he had developed complete paralysis of the right third and fourth cranial nerves. Angiography showed an aneurysm of the distal portion of the right internal carotid artery. It had a small neck and was rather elongated, extending backwards and slightly downwards for about one inch, evidently having recently expanded. At craniotomy on March 3, 1955, a silver clip was placed across the neck of the aneurysm. Angiography after operation showed that the clip had successfully

excluded the aneurysm from the circulation. As yet no recovery of external ocular movements had occurred, but since the operation the patient had had no further migraine headaches and could not bring them on as he had been able to do previously.

A man, aged forty-one years, had had sudden onset of severe headache and vomiting on March 14, 1955. The condition had settled down with the administration of sedatives and bed rest, but twelve days later a second acute episode occurred with intense headache, after which the patient became mentally confused. He was admitted to the Royal Prince Alfred Hospital, and lumbar puncture confirmed the presence of a fresh subarachnoid hæmorrhage. Immediate bilateral angiographic studies demonstrated the presence of three intracranial aneurysms. Two were on the left side, and one was on the right internal carotid artery system. The one on the left middle cerebral artery had evidently been the source of the hæmorrhage, as the segments of the artery adjacent were in spasm and the artery was somewhat displaced, a fact which suggested associated intracerebral clot. In addition, cross filling was demonstrated by the circle of Willis. Immediately a clamp was loosely applied to the left carotid artery in the neck. Three days later, when the patient's clinical condition had improved, the aneurysm was exposed; and as it did not have a well-defined neck, muscle was wrapped around it. A moderate amount of old blood clot was evacuated from the posterior part of the left frontal lobe during the approach to the aneurysm. On the next day the left carotid artery was ligated in the neck, and the clamp was removed from the artery. The patient made an excellent recovery, although his discharge from hospital was delayed by an infection in the neck wound.

Cerebral Glioma.

Dr. Money and Dr. Vanderfield next showed three patients who had been suffering from cerebral glioma. In each case very large areas of the brain anterior to the prefrontal gyrus had been removed with striking lack of obvious defect.

A man, aged thirty-eight years, had for fourteen years been regarded as suffering from chronic idiopathic epilepsy. Full investigation including air studies in 1944 and 1946 had failed to show any focal lesion. Seizures were uncontrolled by anticonvulsant drugs, and the patient was admitted to hospital in *status epilepticus*. On investigation early papilloedema was seen, and in addition plain X-ray films showed some intracranial calcification. Electroencephalography showed a definite focal abnormality in the right fronto-temporal area, and angiography showed an avascular expanding lesion in the right frontal lobe. At craniotomy on October 14, 1954, the frontal lobe, which contained firm neoplastic tissue ("oligodendroglioma"), was dissected back to the precentral gyrus. Since operation the patient had been very well, and his seizures were controlled completely by a reduced dosage of anticonvulsants.

A man, aged twenty-eight years, had presented himself for advice because of the sudden onset of epileptiform seizures. He was found to have severe bilateral papilloedema and seemed somewhat facile. Angiography showed the presence of a large avascular left frontal lesion, and electroencephalography showed left fronto-temporal abnormality. At craniotomy the left frontal lobe, which contained an astrocytoma, was removed, but not as extensively as in the previously described case, in which the lesion was on the right side. After operation the papilloedema subsided. The patient had no further seizures and was now working regularly as a fitter and turner.

A man, aged thirty-three years, had presented himself for advice because of excruciating headaches for six weeks, as well as recent sleepiness and apathy. The only definite finding on examination of the patient was early bilateral papilloedema. Angiography showed a large avascular tumour in the left frontal region. Craniotomy was performed in two stages with removal of the anterior and middle portions of the left frontal lobe containing a cystic and solid astrocytoma. Two weeks after operation the papilloedema had already subsided.

(To be continued.)

VICTORIAN BRANCH NEWS.

Health Education.

A SERIES of five lecturettes on health education will be delivered by Major-General F. Kingsley Norris over the National Broadcasting Network, commencing on Tuesday, March 27, 1956, at 3.30 p.m. The series will deal with accidents, hazards and preventible diseases in the home.

Members of the Association are requested to use these lecturettes as lecture notes for use in their practices.

A second series will be given by Major-General Norris at a later date.

Out of the Past.

In this column will be published from time to time extracts, taken from medical journals, newspapers, official and historical records, diaries and so on, dealing with events connected with the early medical history of Australia.

VITAL STATISTICS.[1]

Governor Phillip to Lord Sydney, February 12, 1790.

As near two years have now passed since we first landed in this country, some judgement may be formed of the climate and I believe that a finer and more healthy climate is not to be found in any part of the world. Of the one thousand and thirty people who were landed, many of whom were worn out by old age, the scurvy and various disorders, only seventy-two have died in twenty-one months: and by the surgeon's returns it appears that 26 of those died from disorders of long standing and which it is more than probable would have carried them off much sooner in England. Fifty-nine children have been born in the same time.

. . . . . .

Since the deaths mentioned in the former part of this letter, one woman has suffered for a robbery, five children have died and 28 children have been born: making in all seventy-seven deaths and eighty-seven births.

Correspondence.

THE PRESENT POSITION OF THE ARMY MEDICAL SERVICES IN AUSTRALIA: A NATIONAL SCANDAL.

SIR: I was relieved to note letters from two contributors (M. J. AUSTRALIA, January 28, 1956) in response to my own letter (M. J. AUSTRALIA, December 17, 1955) on "The Present Position of the Medical Services in Australia: A National Scandal".

I say "relieved" since the profession is often charged with indifference toward controversy—however important—which is not directly related to medical practice. Dr. Stuart and Dr. Carl Gunther, whatever their opinions of my letter, are at least quite aware of its theme, which was not so much the recruiting difficulties of the Royal Australian Army Medical Corps (claimed now to be solved), but rather how we must act to end this nightmare of tension and set about to find a peace worthy of the name. It is, of course, the paramount issue of our time. I regret, however, that these correspondents devoted so much space to a distortion of my reasoning, and so little to a practice of their own. I beg to return to the subject.

It is submitted that victory in a nuclear war is impossible. This conviction was responsible for the recent Geneva conference; and despite the apparent "failure" of that meeting, its origins remain.

Unfortunately the impossibility of victory does not imply the impossibility of war, for although the impossibility of victory is acknowledged, we still remain free to make war in defiance of this new precept, if we choose. If, however, we elect to prove its validity by joining in war, we will in the course of so doing pay with our very existence. War now becomes self-destruction resultant upon the negation or ignorance of a precept. War has never been reducible to these terms before. This is a unique situation. Familiarly known as the "atomic dilemma", its existence is widely ignored, and yet it is as inescapable as the air we breathe. No rational discourse on the pursuit of peace can follow until it is fully accepted. Any discourse which disallows it cannot be termed contemporary, let alone useful. (The use of force or threat in the pursuit of any objective has, of course, been argued according to moral precepts. Its conclusions may be read, and its edicts can still be heard in

[1] From the original in the Mitchell Library, Sydney.

a few churches even today. I choose to make no recourse to them at this time.)

Nuclear warfare as a means of achieving anything—even peace—is then outmoded. It is at this point that current reasonings clash most audibly, and it is too often that the precept becomes lost in a welter of personal indignation, vague fear and national egotism. Among others, the desire to promote expedient becomes acute. For instance, many assert that the factors which have made victory impossible will, *ipso facto*, make war impossible by promoting mutual and equivalent fear. Intense energy is thrown into maintaining this fear. Such a "peace" exists today, and, as agonizing as it may be, I suppose we should be thankful for it. We cannot be proud of it. We dare not trust it. We accept that it can exhaust us in economy, mind and body. Self-destruction (war) may sooner be preferable. Such is the state and course of events today, and our national leaders are at no pains to deny it (perhaps in not so few words, but certainly in thousands more). It was in the light of these things that I wrote my letter (December 17). I certainly do not invite any colleague to quote my words as an "excuse" to avoid another obligation, any more than I advise that a man should recite a "precautionary" line from the Koran before he enters upon a career of bigamy. I merely urge that if a body of thinking men holds that the search for peace no longer admits the efficacy of armed force, then their argument should be assessed, not on their deviation from classic thinking, but rather upon how closely it satisfies the requirements of this new and most vital precept.

The search for peace may be likened to the search for a truth, in that peace will reveal itself only to those who do not fear its shape, and will forever elude those who persistently ignore its mandates. The similarity fades when it is seen that the search for peace has a time limit, the shortness of which no man dares guess.

The inarticulateness on this problem, the savage rejoinder which so often greets its introduction, the fatuous disbelief as to its urgency, leads one to suspect that the time limit has already expired and that we no longer seek anything but freedom to stop the search.

Yours, etc.,
W. S. BENWELL.

Clifton Hill,
Victoria,
February 22, 1956.

SOME PRACTICAL SUGGESTIONS ON TETANUS PROPHYLAXIS.

SIR: In your "Current Comment" column on tetanus prophylaxis (January 7, 1956, page 23), it is stated that "recent studies of clinical tetanus by Stafford, Turner and Goldman and by Vinnard seem to show that the prophylactic use of a single injection of 1500 units of tetanus antitoxin does not alter the mortality rate from tetanus".

Although your commentator, in a later passage, cites Stafford as recommending the prophylactic use of tetanus antitoxin under certain circumstances, the statement quoted above may raise doubts in the minds of doctors as to the value of this form of tetanus prophylaxis. A brief analysis of the findings of Stafford *et alii*, and of Vinnard, therefore, appears warranted.

Stafford *et alii* reported that, between 1928 and 1953, 167 cases of clinical tetanus occurred in Baltimore. One hundred and forty-two of these occurred in individuals who had not received antitoxin, resulting in 71 deaths. The other 25 patients had been given antitoxin at the time of the injury; of these, 13 died. Clearly, the antitoxin prophylaxis did not lower the mortality rate in those who developed clinical tetanus. It may have, nevertheless, prevented the development of clinical tetanus in a number of patients, thus reducing the number of deaths from the disease. Whether that was so cannot be judged by analysing the cases of clinical tetanus. It would be necessary to know also: (*a*) how many people suffered wounds infected with *Clostridium tetani*; (*b*) how many of these received antitoxin prophylactically. Such figures are, as your commentator points out, not available and would be very difficult to obtain. Nevertheless, the data given would seem to indicate that the antitoxin prophylaxis reduced the incidence of clinical tetanus since, of 167 cases of tetanus, in only 25 had antitoxin been given. Even more suggestive in this respect are the data of Langton-Lockton (published in the *Health Bulletin* (Department of Health, Victoria), No. 107, 1952), who found that in none of the 262 cases of tetanus which were notified in Victoria between 1931 and 1950 had antitoxin been given prophylactically.

Another factor must also be taken into consideration. Even if it is assumed that the proportion of persons who developed tetanus was the same whether they had received antitoxin or not, it is highly probable that the two groups were not comparable, since persons with more severe injuries, who may be considered to be more likely to contract tetanus, would also be more likely to be given prophylactic antitoxin. Therefore, the risk of developing tetanus may not be the same in the two groups.

Vinnard estimated the mortality rate due to tetanus between 1934 and 1944 in patients at the Charity Hospital, New Orleans (Louisiana), who had received tetanus antitoxin prophylactically, at 24 per million. He states: "This compares favorably with the records of the Bureau of Vital Statistics, which give an annual mortality in the State of Louisiana of about 40 per million of population." Inasmuch as this comparison is valid, it seems to indicate that prophylactic antitoxin is effective in preventing deaths from tetanus; moreover, as in Stafford's series, a reduction may have occurred in the number of patients who developed clinical disease.

Whatever the shortcomings of the antitoxin prophylaxis against tetanus, and the relative merits of active and passive prophylactic immunizations, the results quoted do not appear to justify the raising of doubts on the efficacy of the prophylactic administration of antitoxin.

Yours, etc.,
EDGAR A. NORTH.
STEPHEN FISHER.

Commonwealth Serum Laboratories,
Parkville, N.2,
Victoria.
March 2, 1956.

Obituary.

GEORGE SEABORNE ROBINSON.

W.W.S.J. writes: The death of Dr. G. S. Robinson announced in this journal on November 12, 1955, should not be allowed to pass without some further reference to the qualities of one who played many parts in the medical life of the community, always effectively and always unselfishly. To the fore as medical student, army doctor, British Medical Association Council member in Victoria, managing director of a large surgical supply house and director of the British Medical Agency of Victoria, his chief interest, nevertheless, was centred in medical practice, and it was as a general practitioner of the highest class that he earned the gratitude of countless patients and the admiration of his colleagues.

George Seaborne Robinson was born in 1887 and was educated at Carlton College, then under the headmastership of his uncle, Gresham Robinson. He owed much to another uncle, L. F. S. Robinson, for many years Supreme Court Librarian, who gave to him sound guidance and deep affection. After leaving school he was for some time employed in W. Ramsay (Surgical), Limited, of which his uncle by marriage, Mr. W. Ramsay, was manager. This early training was a valuable introduction to his work in later life when he himself became managing director of the same firm.

He commenced his medical course in 1909 and qualified in 1914, finishing high in the final honours list with a place on the Melbourne Hospital resident staff. During his course he showed the wide interest in men and affairs that was to characterize him through life, and was for some years a member of the committee of the Medical Students' Society. After a year at the Melbourne Hospital he proceeded in 1915 to the Children's Hospital as resident medical officer, resigning from this position after a short period to enlist in the first Australian Imperial Force.

His first posting for overseas duty was to the hospital ship *Karoola* under the command of Lieutenant-Colonel Gordon Craig, the well-known Sydney surgeon and later benefactor of the Royal Australasian College of Surgeons. But his chief contribution to the Australian Army Medical Corps was as a regimental medical officer, and as such he served the Eleventh Battalion during a period of intense fighting, which included the battles of Lagnicourt, Bullecourt and third Ypres. His common sense and friendliness made him a valued officer, while his sound and practical medical skill, together with personal courage displayed under the most

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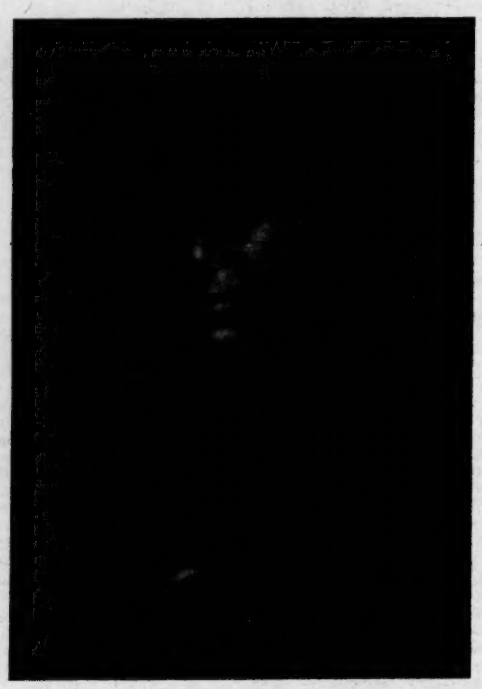
hazardous conditions, earned him the complete confidence of all in his battalion. He was twice decorated for gallantry in the field in 1917, by the award firstly of the Military Cross and secondly, within a short time, of a bar to the cross. The meritorious nature of his actions is referred to in a letter of Sir William Birdwood, G.O.C. Anzac Corps, who congratulated him on the award so thoroughly well earned by his conspicuous courage and devotion to duty in the operations at Louverval, where he worked courageously under continuous heavy shell fire, dressing and evacuating the wounded, and also personally led a party out in front of the line in order to rescue and treat the wounded who had not been collected, this being done under enemy snipers' and machine-gun fire.

A former commanding officer of the Eleventh Battalion, Lieutenant-Colonel E. Hilmer Smith, C.B., V.D., refers to him in the warmest terms and quotes a description taken from the history of the Eleventh Battalion, in which his excellent work at Bullecourt is mentioned, concluding with the words "he was a very capable M.O. and a man in every sense of the word".



In 1918 he returned to Australia and after demobilization commenced practice in Lockhart, New South Wales. Five strenuous years followed and with it a reputation for sterling work and an insight into the problems and troubles of those under his care which brought him life-long friendships. From there he moved to Williamstown in Victoria, where he remained for twenty-two years and again achieved a position of the highest trust and esteem. He allowed himself a small amount of time for such relaxations as golf and racing and was honorary surgeon to the Williamstown Race Club for many years.

During part of this time he acted as deputy quarantine officer and cheerfully accepted the duty of boarding vessels at any hour of the day or night. This work was brought to an end by an unfortunate accident, in which, through no fault of his own, while descending a rope ladder suspended over the side of a ship, he fell and suffered a severe injury to his spine. Occasionally he would spend a week-end with the pilots, among whom he had many friends, in and out of Port Phillip heads.

After the first World War, he continued his association with the army; and over a period of years, when voluntary service was at a low ebb and the number of experienced officers pitifully small, he kept himself and the units under his command effectively trained in preparation for whatever was to come.

On the outbreak of the second World War, he again volunteered at the earliest possible date, and again during more than four years of service put forth all his energy and ability. An illuminating account of his work over this period is given by Brigadier G. F. Langley, D.S.O., E.D., Principal of the Melbourne High School, who has written in the following terms:

> George Robinson's service in World War Two, though not as "active" as in War One, was most important and impressive. After commanding the 6th Field Ambulance in the peace he became A.D.M.S., 4th Division. The defence role of this division was the protection of the Victorian coast, and Colonel Robinson had many and various problems connected with the scattering of the Units over this wide front. When the Division moved to Western Australia in early 1942 the problems were not lessened. Later the Divisional H.Q. moved to North Queensland to command York Zone, and here even greater difficulties had to be surmounted. Throughout it all he displayed a great flair for administration and his wise counsel was sought by all branches. It is not unfair to any member of the Staff of the Division to say that George Robinson was the unifying force amongst this group of officers, brought together from all States. No other officer remained with the H.Q. right through the mobilization to the end and no other officer possessed to such a degree that faculty of seeing and understanding other people's difficulties and helping in their solution.

In this far-ranging command, his activity and initiative found many outlets. His humanitarian work among the natives at such places as Merauke and Thursday Island was quite remarkable. The Jacky Jacky Jockey Club, with its well-organized race meetings, complete in every detail including totalizator, was the outcome of his determination to overcome the depressing effects on the troops of frustrating service in a remote part of Northern Queensland.

He retired from the second Australian Imperial Force towards the end of 1944 and shortly afterwards was awarded the Australian Efficiency Decoration (E.D.). He returned to practice at Williamstown for a short period, relinquishing this to become managing director of Ramsay (Surgical), a position which he occupied until his death.

When the position of medical director of the Australian Red Cross Society became vacant in the middle of 1945, he accepted the appointment and held it until the end of 1947, when he retired on account of increasing pressure of other duties.

The value of his work in Red Cross was stressed by Sir John Newman-Morris, at that time Chairman, National Headquarters, who in an appreciative letter referred to the tremendous amount of help given by him and the inestimable value of his wide experience of medical affairs and service in the Army, together with his common-sense way of looking at problems and his energy in delving into detail during the somewhat critical transition years, as well as over the last few months of the war.

He found time for work in yet another field, and for ten years, until his death, he acted as honorary treasurer of the Prisoners' Aid Society. He spent many hours in the gardens at Pentridge, planting and pruning roses with the prisoners, interesting himself in their lives and endeavouring to bring variety to their dull routine.

Inevitably he began to show the strain; but although his health gradually failed, he was determined that this should not deter him from carrying on with work that had to be done. In this, as in so many tasks throughout life, he was wonderfully helped and supported by his wife, whom as Sister Mollie Carey of the Australian Army Nursing Service he had married while on service overseas in the first World War.

To her and to her son and two daughters, one of whom is married to Dr. Ray Lake, at present doing medical post-graduate work overseas, we offer our fullest sympathy in the death of one whom the medical profession regards as an exemplar of its own high ideals, and whom his friends revere as a loyal, generous and humane comrade.

F.K.N. writes: George Robinson has left an indelible impression upon all who knew him. His life was devoted to the service of his fellow men, his patients, his colleagues and his country. No demand upon him—even during his years of ill health—was unheeded. As a young graduate and later in middle life he served his country in battle. George Robinson could not have done otherwise, and no one has more richly deserved the Military Cross and bar which he wore. George Robinson represented the highest in the practice of medicine and in good citizenship. He was a grand friend; the knowing of him was a privilege.

Post-Graduate Work.

THE MELBOURNE MEDICAL POST-GRADUATE COMMITTEE.

The Royal Melbourne Hospital Post-Graduate Course in Medicine, 1956.

THE honorary medical staff of the Royal Melbourne Hospital will conduct a post-graduate course in medicine, suitable for candidates for higher surgical qualifications, such as M.D. Part II and M.R.A.C.P.

This course will run for eight weeks from June 4 to July 28, 1956. Sessions will be held each day from noon till 1 p.m. and from 2 p.m. to 5.15 p.m. Sessions will also be held from 9.30 a.m. to noon on Saturdays.

Monday, Tuesday, Thursday and Friday Afternoons.—Four afternoons a week (Monday, Tuesday, Thursday and Friday) will be devoted to lectures and case presentations. Each member of the honorary medical staff has been allotted two afternoons in the course. Members of the class will present to the physician the results of examination of patients in the mornings. Discussion of the case will follow, and the physician will outline salient features demonstrated by the case. Sometimes this procedure will be varied by the physician in charge by clinico-pathological presentations of cases from his ward or out-patient clinic. Didactic lectures followed by discussion will occupy the last session of these afternoons. This portion of the course will thus contain 44 case demonstrations and/or clinico-pathological demonstrations and 32 didactic lectures.

Wednesday Afternoons.—Autopsy specimens presented by the pathologist, moving pictures and case demonstrations in neurology, and psychiatric case histories will occupy the Wednesday afternoons.

Morning Sessions.—The morning sessions will be occupied by pathology, ophthalmology, dermatology, electrolyte physiology, allergy, industrial medicine, medical radiology, electrocardiography and a consultative chest clinic.

Saturday Mornings.—For Saturday mornings eight seminars on controversial subjects have been arranged. Members of the panel taking part will each present short papers, to be followed by general discussion. These seminars will be open to all medical practitioners and medical students.

Other Hospital Activities.—Post-graduate students will be made aware of other teaching activities within the hospital—general and specialist out-patient clinics, the consultative cardiac clinic, the resident medical officers' lunch-time clinico-pathological conference on Fridays, gastro-enterological sessions (gastroscopic examinations on Wednesdays at 9 a.m.), the clinical research unit ward rounds (Fridays at 10 a.m.) and the thyroid panel.

Members of the class will be allotted patients for presentation in rotation and will be expected to examine their patients and present their results in detail as is customary in examinations for higher qualifications.

Enrolment.—It is anticipated that a number may wish to take part in the course, yet may not be able to attend on a full-time basis. Arrangements will be made for those wishing to attend certain of the sessions on a part-time basis. Details may be obtained from the Dean's office, The Royal Melbourne Hospital, Parkville (telephone: FJ 0266). Enrolments, accompanied by the fee payable, should be made with the Director of the Melbourne Medical Post-Graduate Committee, 394 Albert Street, East Melbourne (telephone: FB 2547), from whom enrolment forms are obtainable. Entries will be received up till May 18.

Fees.—The fee for the whole course is £10 10s., and for individual lectures 10s. 6d. per lecture. No fee will be charged for attendance at the Saturday morning sessions.

THE POST-GRADUATE COMMITTEE IN MEDICINE IN THE UNIVERSITY OF SYDNEY.

Revision Course in the Basic Medical Sciences.

THE Post-Graduate Committee in Medicine in the University of Sydney announces that a short revision course in the basic medical sciences will be held from April 10 to July 3, 1956, consisting of ten lectures in physiology, nine lecture-demonstrations in anatomy and three lectures each in biochemistry and pharmacology. It is proposed to hold

DISEASES NOTIFIED IN EACH STATE AND TERRITORY OF AUSTRALIA FOR THE WEEK ENDED MARCH 3, 1956.[1]

Disease.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Northern Territory.	Australian Capital Territory.	Australia.
Acute Rheumatism	7(2)	4(3)	1	..	..	..	..	..	12
Amœbiasis	..	..	..	..	1(1)	..	..	..	1
Ancylostomiasis	..	..	7(6)	..	1	..	2	..	10
Anthrax	..	..	..	..	..	..	..	..	..
Bilharziasis	..	..	..	..	..	..	..	..	..
Brucellosis	..	..	..	..	1	..	..	..	1
Cholera	..	..	..	..	..	..	..	..	..
Chorea (St. Vitus)	..	3(3)	..	..	..	..	..	..	3
Dengue	..	..	..	..	..	..	..	..	..
Diarrhœa (Infantile)	1	18(17)	5(3)	..	..	..	..	..	24
Diphtheria	1(1)	1(1)	..	..	2(2)	..	..	..	4
Dysentery (Bacillary)	..	1(1)	13(13)	..	3(3)	..	..	..	17
Encephalitis	..	1(1)	..	1(1)	..	..	..	..	2
Filariasis	..	..	..	..	..	..	..	..	..
Homologous Serum Jaundice	..	..	..	..	..	..	..	..	..
Hydatid	..	1(1)	..	..	..	..	..	..	1
Infective Hepatitis	114(57)	92(45)	..	33(17)	4(3)	..	..	1	244
Lead Poisoning	..	..	1	..	..	..	..	..	1
Leprosy	..	..	..	..	..	..	..	..	..
Leptospirosis	..	..	1	..	..	..	..	..	1
Malaria	..	..	2(1)	..	1(1)	..	..	..	3
Meningococcal Infection	5(3)	2(1)	..	..	..	..	..	..	7
Ophthalmia	..	..	..	..	3	..	..	..	3
Ornithosis	..	..	..	..	..	..	..	..	..
Paratyphoid	..	..	..	..	..	4	..	..	4
Plague	..	..	..	..	..	..	..	..	..
Poliomyelitis	8(1)	4(3)	1(1)	1(1)	21(14)	1	..	2	38
Puerperal Fever	..	..	..	..	..	..	..	..	..
Rubella	..	17(13)	..	7(1)	1	..	..	..	25
Salmonella Infection	..	..	..	..	..	..	..	..	..
Scarlet Fever	11(5)	11(7)	5(4)	5(1)	1	..	..	..	33
Smallpox	..	..	..	..	..	..	..	..	..
Tetanus	..	1	1	..	..	..	..	..	2
Trachoma	..	..	..	..	5(4)	..	..	..	5
Trichinosis	..	..	..	..	..	..	..	..	..
Tuberculosis	40(22)	19(13)	10(3)	10(7)	6(4)	7(3)	..	1	93
Typhoid Fever	..	..	..	..	..	..	..	..	..
Typhus (Flea-, Mite- and Tick-borne)	..	..	1	..	2(1)	..	..	..	3
Typhus (Louse-borne)	..	..	..	..	..	..	..	..	..
Yellow Fever	..	..	..	..	..	..	..	..	..

[1] Figures in parentheses are those for the metropolitan area.

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these lectures on Tuesdays and Thursdays each week at 8 p.m. in Macquarie Street. Several lecture-demonstrations in anatomy will be held at the Old Medical School at 4 p.m. on Thursdays. The course is designed for those desiring to revise their knowledge of the basic sciences and for practitioners undertaking preliminary reading prior to attending Part I of diploma courses. Fees for attendance are £10 10s. full time or £6 6s. part time. Early written application, enclosing remittance, should be forwarded to the Course Secretary, The Post-Graduate Committee in Medicine, 131 Macquarie Street, Sydney, from whom further details may be obtained. Telephones: BU 4497-8. Telegraphic address: "Postgrad Sydney."

Week-End Course in Diabetes: Corrigendum.

The Post-Graduate Committee in Medicine in the University of Sydney wishes to correct the dates of the special week-end course in diabetes to be held at the Royal North Shore Hospital this year. This course will now be conducted on Saturday and Sunday, May 26 and 27, instead of April 14 and 15, 1956.

Nominations and Elections.

THE undermentioned have applied for election as members of the New South Wales Branch of the British Medical Association:

White, Geoffrey Roy, M.B., B.S., 1953 (Univ. Sydney), 135 Beaumont Street, Hamilton, Newcastle, New South Wales.

Bernard, Henryk Bierzynski, M.B., B.S., 1953 (Univ. Sydney), 9A Planthurst Road, Carlton, New South Wales.

The undermentioned have been elected as members of the *New South Wales Branch of the British Medical Association*: Augulis, Visvaldis (provisionally registered), M.B., B.S., 1956 (Univ. Sydney); Daly, Ian Charles (provisionally registered), M.B., B.S., 1956 (Univ. Sydney); Johnson, James Ronald (provisionally registered), M.B., B.S., 1956 (Univ. Sydney); Lai, Min Let (provisionally registered), M.B., B.S. 1956 (Univ. Sydney); Lambert, Leon Warren (provisionally registered), M.B., B.S., 1956 (Univ. Sydney); Penney, Douglas James (provisionally registered), M.B., B.S., 1956 (Univ. Sydney); Rothwell, Frederick Leigh (provisionally registered), M.B., B.S., 1956 (Univ. Sydney); Smartt, Herbert Henry (provisionally registered), M.B., B.S., 1956 (Univ. Sydney); Smidlin, Richard John (provisionally registered), M.B., B.S., 1956 (Univ. Sydney); Lloyd, Alan Murray, M.B., B.S., 1955 (Univ. Sydney); Ng, Hein Wah Francis, M.B., B.S., 1955 (Univ. Sydney); Oakley, June Rosalind Lytton, M.B., B.S., 1955 (Univ. Sydney); Brighton, William Harold, M.B., B.S., 1954 (Univ. Sydney); Harris, Leon Eugene, M.B., B.S., 1954 (Univ. Sydney); Mitchell, Henry James, M.B., B.S., 1954 (Univ. Sydney); Stark, Harry, M.B., B.S., 1954 (Univ. Sydney); Feldman, Abram Isaak, registered in accordance with the provisions of Section 17 (1) (*c*) of the *Medical Practitioners Act*, 1938-1955; Brandson, Andrew Samuel, registered in accordance with the provisions of Section 17 (1) (*c*) of the *Medical Practitioners Act*, 1938-1955; Grima, Carmel Paul, registered in accordance with the provisions of Section 17 (1) (*b*) of the *Medical Practitioners Act*, 1938-1955; Pohl, Hans Joachim, registered in accordance with the provisions of Section 17 (1) (*c*) of the *Medical Practitioners Act*, 1938-1955; Sarko, Nikolai, regional registration for practice in the Premer District; Roller, Abraham, registered in accordance with the provisions of Section 17 (1) (*c*) of the *Medical Practitioners Act*, 1938-1955.

The undermentioned have applied for election as members of the South Australian Branch of the British Medical Association:

Burton, Patrick Andrew, M.B., B.S., 1955 (Univ. Adelaide), 16 Martens Avenue, Fullarton Estate, South Australia.

Lynch, Martin Alfred, M.B., B.S., 1954 (Univ. Adelaide), 33 Gascoyne Avenue, Hillcrest, South Australia.

The undermentioned have been elected as members of the South Australian Branch of the British Medical Association: Southgate, Deane Oakford, qualified 1954; Smibert, George James, qualified 1954; Lykke, Athol William John, qualified 1954; Pirotta, Thomas, qualified 1954; Beer, Barbara Helen, qualified 1954.

Deaths.

THE following deaths have been announced:

NIVEN.—Duncan Robertson Niven, on February 3, 1956, at Portland, Victoria.

RICHARDS.—Eulalia Sisley Richards, on March 15, 1956, at Manly, New South Wales.

Diary for the Month.

MARCH 27.—New South Wales Branch, B.M.A.: Council Meeting.
MARCH 28.—Victorian Branch, B.M.A.: Branch Council.
MARCH 29.—South Australian Branch, B.M.A.: Scientific Meeting.
APRIL 3.—New South Wales Branch, B.M.A.: Organization and Science Committee.
APRIL 4.—Western Australian Branch, B.M.A.: Branch Council.
APRIL 6.—Queensland Branch, B.M.A.: General Meeting.
APRIL 10.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
APRIL 13.—Tasmanian Branch, B.M.A.: Branch Council.
APRIL 13.—Queensland Branch, B.M.A.: Council Meeting.
APRIL 16.—Victorian Branch, B.M.A.: Finance Subcommittee.
APRIL 17.—New South Wales Branch, B.M.A.: Medical Politics Committee.
APRIL 18.—Victorian Branch, B.M.A.: Branch Meeting.
APRIL 18.—Western Australian Branch, B.M.A.: General Meeting.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Medical Secretary, 135 Macquarie Street, Sydney): All contract practice appointments in New South Wales.

Queensland Branch (Honorary Secretary, B.M.A. House, 225 Wickham Terrace, Brisbane, B17): Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 80 Brougham Place, North Adelaide): All contract practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 8 King's Park, West Perth): Norseman Hospital; all contract practice appointments in Western Australia. All government appointments with the exception of those of the Department of Public Health.

Editorial Notices.

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